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TEMPERATURE-DEPENDENT DEVELOPMENT RATE TABLES FOR INSECTS ASSOCIATED WITH COTTON IN THE SOUTHWEST

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ABSTRACT

Tables are presented for the duration of the different developmental stages of 11 insect species harmful to cotton in the Southwest and for 9 species considered as beneficial insect predators. The number of days required for each stage is given as well as the percent of development per day for each 1/2° Fahrenheit from 55° to 95°. Suggestions for the use of the tables are given for predicting the development of the different species under constant temperature conditions found in the laboratory as well as under fluctuating temperatures encountered in the field.

KEYWORDS: Cotton Insects, Development, Temperature, Insects, Beet Armyworm, Bollworm, Cabbage Looper, Cotton Leafperforator, Lygus Bugs, Pink Bollworm, Tobacco Budworm

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TEMPERATURE-DEPENDENT DEVELOPMENT RATE TABLES FOR INSECTS ASSOCIATED WITH COTTON IN THE SOUTHWEST

By G. D. Butler, Jr., and T. J. Henneberry[1]

INTRODUCTION

Temperature has long been recognized as a primary environmental factor influencing the rate of insect development. Although much information is available regarding the subject, no attempt has been made to bring the data together in a readily accessible and usable form. In the present paper, we have used the results of many studies on temperature effects on southwestern cotton insects to develop a set of tables of temperature-dependent development rates for many of the known harmful and beneficial species discussed by Wene et al. (*24*).[2] The data in the tables are intended for use by cotton research entomologists in the laboratory and field and by pest managers in the field as a tool for the rapid solution of real problems.

METHODS

Appendix table 1 (page 6) lists the references from which the life history data were derived for each species. The values used in the regression equations, the temperature ranges used, the number of different temperatures (n), and an estimate of the goodness of fit (r^2) are also given. The tabular values were calculated using the simple linear regression equation $\hat{y} = a + bX$, where $\hat{y}$ X 100 is the percentage of development per day and X is the average daily temperature in degrees Fahrenheit. Thus, $1/\hat{y}$ X 100 is equal to the number of days required for a stage.

APPLICATIONS

Tables 2 to 20 (pages 8 to 44) of this bulletin provide the calculated predictions of developmental rates at different temperatures, expressed in days and as the percentage of development per day, for the immature stages in the life history of 19 insect species associated with cotton (table 1). These tables provide the necessary data for the user to program development of any immature stage of the listed species, thus determining optimum rearing environments and meeting his projected production requirements. (Note that although development rates are greatest at high temperatures, survival is lower.) This information will also permit a researcher to predict the development of stages held under a variable temperature regime. In addition, the prudent application of the tables

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[2]Italic numbers in parentheses refer to References, p. 3.

in conjunction with survey techniques can aid the pest manager in efficient scheduling of sampling and control measures.

The following examples illustrate some potential applications:

1. If a rearing room is held at 70° F, how many days will be required for development of the egg, larval, and pupal stages of the pink bollworm? Read the answer directly from table 9: 8.1 days for the egg, 30.9 days for the larval, and 16.1 days for the pupal stage.

2. At what temperature should newly hatched pink bollworm larvae be held to provide new pupae for irradiation in 23 days? Read the answer directly from table 9: Larvae should be held at 75° F.

3. Newly hatched pink bollworm larvae were placed in an insectary that had an average temperature (high temperature + low temperature divided by two) of 70° F on the first day, 80° the next, and 75° on the third. What percentage of development had taken place by the end of the third day? Read the answer directly from table 9: Development during the first through the third days was 3.24, 5.47, and 4.35 percent, respectively. The sum of these percentages (3.24 + 5.47 + 4.35 = 13.06) is the percentage of development at the end of the third day.

4. On the nights of June 10, 11, and 12, gossyplure-baited traps caught a large number of overwintering pink bollworm moths. A pest manager of this farm is concerned with possible lygus bug migrations from nearby alfalfa and safflower during the last week of June and the first week of July. Will he have to discontinue the lygus bug sampling during the first week of July and start sampling bolls to monitor the expansion of this pink bollworm population? The answer is calculated from table 9. Development of the pink bollworm would take 20.9 days at an average daily temperature of 95° F (3.5 days for the egg plus 11.3 days for larval plus 6.1 days for pupal). At this fastest possible rate of development, an additional 3.5 days would be required for the second generation eggs to hatch and then several additional days before larvae in the bolls would be large enough to be easily detected. Thus, if these results are consistent with actual field observations, boll sampling for pink bollworms will not be productive for at least 25 days or until about July 7.

COMPLICATIONS AND LIMITATIONS

All biological systems are dynamic and variable; temperature dependent developmental rates are no exception. Rates and times of development given for each temperature in this publication are estimates for the average individual. Exceptionally slow and rapid developers are always found in natural populations. Stinner et al. (*21*) give an algorithm for simulating this variability in computer models of insect development.

In this publication, 55° F is used as a low-temperature threshold, except for a few cases where slightly higher temperatures are the thresholds. Negative developmental rates obtained from regression equations are ignored. Thus, when calculating the average daily temperature with a minimum temperature below 55°, 55° is used as the minimum temperature. The rate of development for most insects does not continue to increase after temperatures rise above a certain value. Generally, for southwestern cotton insects, the maximum rate of development occurs at an average ambient temperature of 95°. At this temperature and above, the microenvironment may moderate the maximum temperature. We suggest that 2° be subtracted for each 1° above 95° and the resulting temperature value be used as the maximum temperature for the day.

We recognize that at high and low temperatures the rate of development deviates considerably from that estimated by a linear regression equation. Stinner et al. (22) present an algorithm that utilizes a sigmoid function to provide a better estimate. The use of this algorithm necessitates much more extensive tables based on all possible combinations of different daily maximum and minimum temperatures unless the calculation is made in a computer. In the present paper, the algorithm, particularly at high temperatures, can be simulated by the adjustment of the maximum daily temperature.

As fieldmen and researchers become familiar with the use of these techniques, computers can be programed with the more advanced algorithms to give better estimates. When this is done, more precise measurements of temperature will be required in microhabitats, such as on leaf surfaces, within bolls, and in the soil. We assume that at present most fieldmen and researchers using this bulletin will be obtaining field temperatures from a nearby weather station.

REFERENCES

1. Butler, G. D., Jr.
1966. Development of several predaceous hemiptera in relation to temperature. Jour. Econ. Ent. 59: 1306-1307.

2. _____
1966. Development of the beet armyworm and its parasite *Chelonus texanus* in relation to temperature. Jour. Econ. Ent. 59: 1324-1327.

3. _____
1967. Development of the banded-wing whitefly at different temperatures. Jour. Econ. Ent. 60: 877-878.

4. _____
1970. Temperature and the development of egg and nymphal stages of *Lygus desertus*. Jour. Econ. Ent. 63: 1994-1995.

5. _____
1976. Bollworm: Development in relation to temperature and larval food. Environ Ent. 5: 520-522.

6. _____ and Dickerson, W. A.
1972. Life cycle of the convergent lady beetle in relation to temperature. Jour. Econ. Ent. 65: 1508-1509.

7. _____ and Hamilton, A. G.
Development time of *Heliothis virescens* in relation to constant temperature. Environ. Ent. 5: 759-760.

8. _____ and Hamilton, A. G.
Temperature dependent development rates for four strains of *Pectinophora gossypiella*. Ann. Ent. Soc. Amer. 69: 450-452.

9. _____ Hamilton, A. G., and Bartlett, A. C.
1975. Development of the dark strain of cabbage looper in relation to temperature. Environ. Ent. 4: 619-620.

10. Butler, G. D., and Ritchie, P. L., Jr.
1970. Development of *Chrysopa carnea* at constant and fluctuating temperatures. Jour. Econ. Ent. 63: 1028-1030.

11. _____ Stinner, R. E., and Green, G. L.
The application of a thermodynamic model for the development of the cabbage looper at fluctuating temperatures. Fla. Ent. 59: 165-169.

12. _____ and Stoner, A.
1965. The biology of *Spanogonicus albofasciatus*. Jour. Econ. Ent. 58: 664-665.

13. _____ and Wardecker, A. L.
1971. Temperature and the development of eggs and nymphs of *Lygus hesperus*. Ann. Ent. Soc. Amer. 64: 144-145.

14. _____ and Wardecker, A. L.
1973. *Collops vittatus* (Coleoptera: Malachiidae): Development at constant temperatures. Ann. Ent. Soc. Amer. 66: 1168-1170.

15. Champlain, R. A., and Butler, G. D., Jr.
1967. Temperature effects on the development of the egg and nymphal stages of *Lygus hesperus*. Ann. Ent. Soc. Amer. 60: 519-521.

16. Eubank, W. P., Atmar, J. W., and Ellington, J. J.
1973. The significance and thermodynamics of fluctuating versus static thermal environments on *Heliothis zea* egg development rates. Environ. Ent. 2: 491-496.

17. Fye, R. E., and McAda, W. C.
1972. Laboratory studies on the development, longevity, and fecundity of six lepidopterous pests of cotton in Arizona. U.S. Dept. Agr. Tech. Bul. 1454, 71 pp.

18. _____ and May, C. J.
1974. Development, fecundity, and longevity of the cotton leafperforator in relation to temperature. U.S. Dept. Agr., Agr. Res. Serv. ARS W-12, 5 pp.

19. Jackson, C. G., Butler, G. D., Jr., and Bryan, D. E.
1969. Time required for development of *Voria ruralis* and its host, the cabbage looper, at different temperatures. Jour. Econ. Ent. 62: 69-70.

20. Owen, W. L., Jr., and Calhoun, S. L.
1932. Biology of the pink bollworm at Presidio, Texas. Jour. Econ. Ent. 25: 746-751.

21. Stinner, R. E., Butler, G. D., Jr., Bacheler, J. S., and Tuttle, C.
1975. Simulation of temperature-dependent development in population dynamics models. Canad. Ent. 107: 1167-1174.

22. Stinner, R. E., Gutierrez, A. P., and Butler, G. D., Jr.
1974. An algorithm for temperature-dependent growth rate simulation. Canad. Ent. 106: 519-524.

23. Toba, H. H., Kishaba, A. N., Pangalden, R., and Vail, P. V.
1973. Temperature and the development of the cabbage looper. Ann. Ent. Soc. Amer. 66: 965-974.

24. Wene, G. P., Carruth, L. A., and Telford, A. D.
1965. Descriptions and habits of Arizona cotton insects. Ariz. Agr. Expt. Sta. Bul. A-23, 61 pp.

APPENDIX TABLES

TABLE 1.--TABLE NUMBER, NAME OF HARMFUL OR BENEFICIAL INSECTS WITH THE RANGE OF TEMPERATURES USED, REGRESSION EQUATIONS USED, NUMBERS OF TEMPERATURES USED, GOODNESS OF FIT, AND REFERENCES USED TO PREPARE TABLES

HARMFUL INSECTS

TABLE	NAME	STAGE	TEMP RANGE	REGRESSION EQUATION	NO	R2	REFERENCES
2.	BEET ARMYWORM. SPODOPTERA EXIGUA (HUBNER)						2
		EGG	65.0-95.0	-0.33844 +0.00824X	7	.97	
		LARVAL	59.0-95.0	-0.10245 +0.00213X	19	.94	
		PUPAL	59.0-95.0	-0.23838 +0.00477X	19	.96	
3.	BLACK FLEAHOPPER. SPANOGONICUS ALBOFASCIATUS (REUT.)						12
		EGG	65.0-95.0	-0.12467 +0.00294X	7	.94	
		NYMPHAL	65.0-95.0	-0.12859 +0.00242X	7	.96	
4.	BOLLWORM. HELIOTHIS ZEA (BODDIE)						
		EGG	68.0-91.4	-0.53965 +0.01085X	10	.96	5,16,17,19
		LARVAL	68.0-93.2	-0.05800 +0.00127X	6	.99	5
		PUPAL	60.0-95.0	-0.16652 +0.00307X	9	.98	5
5.	CABBAGE LOOPER. TRICHOPLUSIA NI (HUBNER)						
		EGG	59.0-91.5	-0.50692 +0.01061X	16	.96	17,19,23
		LARVAL	56.3-91.4	-0.14159 +0.00274X	52	.92	9,11,17,19,23
		PUPAL	56.3-90.0	-0.31697 +0.00577X	50	.97	9,17,19,23
6.	COTTON LEAFPERFORATOR. BUCCULATRIX THURBERIELLA BUSCK						17
		EGG	68.0-95.0	-0.28225 +0.00577X	10	.99	
		LARVAL	68.0-86.0	-0.27343 +0.00516X	8	.99	
		PUPAL	68.0-95.0	-0.40614 +0.00714X	10	.95	
7.	LYGUS DESERTUS KNIGHT						4
		EGG	68.0-80.0	-0.24568 +0.00468X	3	.99	
		NYMPHAL	68.0-86.0	-0.14777 +0.00281X	4	.99	
8.	LYGUS HESPERUS KNIGHT						13,15
		EGG	59.0-95.0	-0.16864 +0.00372X	15	.95	
		NYMPHAL	50.0-95.0	-0.08544 +0.00191X	19	.96	
9.	PINK BOLLWORM. PECTINOPHORA GOSSYPIELLA (SAUNDERS)						
		EGG	53.2-91.5	-0.33772 +0.00658X	11	.95	8,17,20
		LARVAL	63.5-89.6	-0.12374 +0.00223X	13	.99	8
		PUPAL	63.5-89.6	-0.22421 +0.00409X	13	.98	8
10.	TOBACCO BUDWORM. HELIOTHIS VIRESCENS (FABRICIUS)						7,17
		EGG	52.0-93.2	-0.52391 +0.01054X	14	.95	
		LARVAL	59.0-93.2	-0.11842 +0.00232X	15	.97	
		PUPAL	63.5-93.2	-0.15524 +0.00289X	14	.95	
11.	WHITEFLY. TRIALEURODES ABUTILONEA (HALDEMAN)						3
		EGG	65.0-95.0	-0.17110 +0.00396X	7	.93	
		LARVAL	65.0-95.0	-0.06849 +0.00160X	7	.95	
		PUPAL	75.0-95.0	-0.02622 +0.00566X	3	.92	

BENEFICIAL INSECTS

TABLE	NAME	STAGE	TEMP RANGE	REGRESSION EQUATION	NO	R2	REFER.
12.	BIG-EYED BUG. GEOCORIS PALLENS STAL						1
		EGG	68.0-86.0	-0.43614 +0.00742X	3	.98	
		NYMPHAL	68.0-86.0	-0.17079 +0.00277X	3	.99	
13.	BIG-EYED BUG. GEOCORIS PUNCTIPES (SAY)						I
		EGG	68.0-86.0	-0.38145 +0.00647X	3	.99	
		NYMPHAL	68.0-86.0	-0.08724 +0.00158X	3	.95	

TABLE 1.--TABLE NUMBER, NAME OF HARMFUL OR BENEFICIAL INSECTS WITH THE RANGE OF TEMPERATURES USED, REGRESSION EQUATIONS USED, NUMBERS OF TEMPERATURES USED, GOODNESS OF FIT, AND REFERENCES USED TO PREPARE TABLES--CONTINUED.

BENEFICIAL INSECTS--CONTINUED

TABLE	NAME	STAGE	TEMP RANGE	REGRESSION EQUATION	NO	R2	REFERENCES
14.	COMMON GREEN LACEWING, CHRYSOPA CARNEA STEPHENS						10
		EGG	59.0-95.0	-0.33447 +0.00724X	9	.95	
		LARVAL	59.0-95.0	-0.16139 +0.00339X	10	.96	
		PUPAL	68.0-95.0	-0.15981 +0.00350X	18	.96	
15.	CONVERGENT LADY BEETLE, HIPPODAMIA CONVERGENS GUERIN-MENEVILLE						6
		EGG	68.0-93.0	-0.74141 +0.01407X	6	.89	
		LARVAL	68.0-93.0	-0.10464 +0.00226X	6	.90	
		PUPAL	59.0-99.0	-0.39818 +0.00813X	14	.94	
16.	LEAFHOPPER ASSASSIN BUG, ZELUS RENARDII KOLENATI						1
		EGG	59.0-86.0	-0.29848 +0.00562X	4	.99	
		NYMPHAL	68.0-86.0	-0.05283 +0.00104X	3	.85	
17.	LEAFHOPPER ASSASSIN BUG, ZELUS SOCIUS UHLER						1
		EGG	59.0-86.0	-0.33425 +0.00622X	4	.97	
		NYMPHAL	68.0-86.0	-0.04545 +0.00095X	3	.93	
18.	MINUTE PIRATE BUG, ORIUS TRISTICOLOR (WHITE)						1
		EGG	68.0-95.0	-0.39708 +0.00844X	4	.97	
		NYMPHAL	68.0-95.0	-0.5234+ +0.0016+X	4	.98	
19.	SPINED SOLDIER BUG, SINEA CONFUSA CAUDELL						1
		EGG	59.0-86.0	-0.28084 +0.00509X	4	.97	
		NYMPHAL	68.0-86.0	-0.06412 +0.00115X	3	.95	
20.	STRIPED COLLOPS, COLLOPS VITTATUS (SAY)						13
		EGG	60.0-102.	-0.33712 +0.00578X	8	.96	
		LARVAL	73.0-95.0	-0.09570 +0.00143X	5	.99	
		PUPAL	73.0-95.0	-0.52493 +0.00841X	6	.96	

TABLE 2.--BEET ARMYWORM, SPODOPTERA EXIGUA (HUBNER)

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
55.0	8.7	68.0	41.7	11.48	1.47	2.40
55.5	8.4	63.4	37.9	11.89	1.58	2.64
56.0	8.1	59.4	34.8	12.30	1.68	2.87
56.5	7.9	55.9	32.1	12.71	1.79	3.11
57.0	7.6	52.7	29.8	13.12	1.90	3.35
57.5	7.4	49.9	27.9	13.54	2.00	3.59
58.0	7.2	47.4	26.1	13.95	2.11	3.83
58.5	7.0	45.1	24.6	14.36	2.22	4.07
59.0	6.8	43.1	23.2	14.77	2.32	4.30
59.5	6.6	41.2	22.0	15.18	2.43	4.54
60.0	6.4	39.4	20.9	15.60	2.53	4.78
60.5	6.2	37.9	19.9	16.01	2.64	5.02
61.0	6.1	36.4	19.0	16.42	2.75	5.26
61.5	5.9	35.0	18.2	16.83	2.85	5.50
62.0	5.8	33.8	17.4	17.24	2.96	5.74
62.5	5.7	32.6	16.7	17.66	3.07	5.97

TABLE 2.--BEET ARMYWORM, SPODOPTERA EXIGUA (HUBNER)--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
63.0	5.5	31.5	16.1	18.07	3.17	6.21
63.5	5.4	30.5	15.5	18.48	3.28	6.45
64.0	5.3	29.5	14.9	18.89	3.39	6.69
64.5	5.2	28.6	14.4	19.30	3.49	6.93
65.0	5.1	27.8	14.0	19.72	3.60	7.17
65.5	5.0	27.0	13.5	20.13	3.71	7.41
66.0	4.9	26.2	13.1	20.54	3.81	7.64
66.5	4.8	25.5	12.7	20.95	3.92	7.88
67.0	4.7	24.8	12.3	21.36	4.03	8.12
67.5	4.6	24.2	12.0	21.78	4.13	8.36
68.0	4.5	23.6	11.6	22.19	4.24	8.60
68.5	4.4	23.0	11.3	22.60	4.35	8.84
69.0	4.3	22.5	11.0	23.01	4.45	9.07
69.5	4.3	21.9	10.7	23.42	4.56	9.31
70.0	4.2	21.4	10.5	23.84	4.66	9.55
70.5	4.1	21.0	10.2	24.25	4.77	9.79
71.0	4.1	20.5	10.0	24.66	4.88	10.03
71.5	4.0	20.1	9.7	25.07	4.98	10.27
72.0	3.9	19.6	9.5	25.48	5.09	10.51
72.5	3.9	19.2	9.3	25.90	5.20	10.74
73.0	3.8	18.9	9.1	26.31	5.30	10.98
73.5	3.7	18.5	8.9	26.72	5.41	11.22
74.0	3.7	18.1	8.7	27.13	5.52	11.46
74.5	3.6	17.8	8.5	27.54	5.62	11.70
75.0	3.6	17.5	8.4	27.96	5.73	11.94
75.5	3.5	17.1	8.2	28.37	5.84	12.18
76.0	3.5	16.8	8.1	28.78	5.94	12.41
76.5	3.4	16.5	7.9	29.19	6.05	12.65
77.0	3.4	16.2	7.8	29.60	6.16	12.89
77.5	3.3	16.0	7.6	30.02	6.26	13.13
78.0	3.3	15.7	7.5	30.43	6.37	13.37
78.5	3.2	15.4	7.3	30.84	6.48	13.61
79.0	3.2	15.2	7.2	31.25	6.58	13.84
79.5	3.2	15.0	7.1	31.66	6.69	14.08
80.0	3.1	14.7	7.0	32.08	6.79	14.32
80.5	3.1	14.5	6.9	32.49	6.90	14.56
81.0	3.0	14.3	6.8	32.90	7.01	14.80
81.5	3.0	14.1	6.7	33.31	7.11	15.04
82.0	3.0	13.9	6.5	33.72	7.22	15.28
82.5	2.9	13.6	6.4	34.14	7.33	15.51
83.0	2.9	13.5	6.3	34.55	7.43	15.75
83.5	2.9	13.3	6.3	34.96	7.54	15.99
84.0	2.8	13.1	6.2	35.37	7.65	16.23
84.5	2.8	12.9	6.1	35.78	7.75	16.47
85.0	2.8	12.7	6.0	36.20	7.86	16.71
85.5	2.7	12.6	5.9	36.61	7.97	16.95
86.0	2.7	12.4	5.8	37.02	8.07	17.18
86.5	2.7	12.2	5.7	37.43	8.18	17.42
87.0	2.6	12.1	5.7	37.84	8.29	17.66
87.5	2.6	11.9	5.6	38.26	8.39	17.90
88.0	2.6	11.8	5.5	38.67	8.50	18.14
88.5	2.6	11.6	5.4	39.08	8.61	18.38
89.0	2.5	11.5	5.4	39.49	8.71	18.61
89.5	2.5	11.3	5.3	39.90	8.82	18.85
90.0	2.5	11.2	5.2	40.32	8.92	19.09
90.5	2.5	11.1	5.2	40.73	9.03	19.33
91.0	2.4	11.0	5.1	41.14	9.14	19.57
91.5	2.4	10.9	5.0	41.55	9.24	19.81
92.0	2.4	10.7	5.0	41.96	9.35	20.05

TABLE 2.--BEET ARMYWORM, SPODOPTERA EXIGUA (HUBNER)--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
92.5	2.4	10.6	4.9	42.38	9.46	20.28
93.0	2.3	10.5	4.9	42.79	9.56	20.52
93.5	2.3	10.3	4.8	43.20	9.67	20.76
94.0	2.3	10.2	4.8	43.61	9.78	21.00
94.5	2.3	10.1	4.7	44.02	9.88	21.24
95.0	2.3	10.0	4.7	44.44	9.99	21.48

TABLE 3.--BLACK FLEAHOPPER, SPANAGONICUS ALBOFASCIATUS (REUT.)

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY

	DURATION		PERCENT	
TEMP-F	EGG	NYMPHAL	EGG	NYMPHAL
55.0	27.0	221.7	3.70	.45
55.5	26.0	174.8	3.85	.57
56.0	25.0	144.3	4.00	.69
56.5	24.1	122.9	4.14	.81
57.0	23.3	107.0	4.29	.93
57.5	22.5	94.7	4.44	1.06
58.0	21.8	85.0	4.58	1.18
58.5	21.1	77.0	4.73	1.30
59.0	20.5	70.5	4.88	1.42
59.5	19.9	64.9	5.03	1.54
60.0	19.3	60.2	5.17	1.66
60.5	18.8	56.1	5.32	1.78
61.0	18.3	52.5	5.47	1.90
61.5	17.8	49.4	5.61	2.02
62.0	17.4	46.6	5.76	2.14
62.5	16.9	44.1	5.91	2.27
63.0	16.5	41.9	6.05	2.39
63.5	16.1	39.9	6.20	2.51
64.0	15.8	38.0	6.35	2.63
64.5	15.4	36.4	6.50	2.75
65.0	15.1	34.8	6.64	2.87
65.5	14.7	33.4	6.79	2.99
66.0	14.4	32.1	6.94	3.11
66.5	14.1	30.9	7.08	3.23
67.0	13.9	29.8	7.23	3.35
67.5	13.6	28.8	7.38	3.48
68.0	13.3	27.8	7.52	3.60
68.5	13.0	26.9	7.67	3.72
69.0	12.8	26.0	7.82	3.84
69.5	12.6	25.3	7.97	3.96
70.0	12.3	24.5	8.11	4.08
70.5	12.1	23.8	8.26	4.20
71.0	11.9	23.1	8.41	4.32
71.5	11.7	22.5	8.55	4.44
72.0	11.5	21.9	8.70	4.56
72.5	11.3	21.3	8.85	4.69
73.0	11.1	20.8	8.99	4.81
73.5	11.0	20.3	9.14	4.93
74.0	10.8	19.8	9.29	5.05
74.5	10.6	19.3	9.44	5.17
75.0	10.4	18.9	9.58	5.29
75.5	10.3	18.5	9.73	5.41

TABLE 3.--BLACK FLEAHOPPER, SPANAGONICUS ALBOFASCIATUS (REUT.)--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY

	DURATION		PERCENT	
TEMP-F	EGG	NYMPHAL	EGG	NUMPHAL
76.0	10.1	18.1	9.88	5.53
76.5	10.0	17.7	10.02	5.65
77.0	9.8	17.3	10.17	5.78
77.5	9.7	17.0	10.32	5.90
78.0	9.6	16.6	10.46	6.02
78.5	9.4	16.3	10.61	6.14
79.0	9.3	16.0	10.76	6.26
79.5	9.2	15.7	10.91	6.38
80.0	9.0	15.4	11.05	6.50
80.5	8.9	15.1	11.20	6.62
81.0	8.8	14.8	11.35	6.74
81.5	8.7	14.5	11.49	6.86
82.0	8.6	14.3	11.64	6.98
82.5	8.5	14.1	11.79	7.11
83.0	8.4	13.8	11.93	7.23
83.5	8.3	13.6	12.08	7.35
84.0	8.2	13.4	12.23	7.47
84.5	8.1	13.2	12.38	7.59
85.0	8.0	13.0	12.52	7.71
85.5	7.9	12.8	12.67	7.83
86.0	7.8	12.6	12.82	7.95
86.5	7.7	12.4	12.96	8.07
87.0	7.6	12.2	13.11	8.19
87.5	7.5	12.0	13.26	8.32
88.0	7.5	11.9	13.40	8.44
88.5	7.4	11.7	13.55	8.56
89.0	7.3	11.5	13.70	8.68
89.5	7.2	11.4	13.85	8.80
90.0	7.1	11.2	13.99	8.92
90.5	7.1	11.1	14.14	9.04
91.0	7.0	10.9	14.29	9.16
91.5	6.9	10.8	14.43	9.28
92.0	6.9	10.6	14.58	9.40
92.5	6.8	10.5	14.73	9.53
93.0	6.7	10.4	14.87	9.65
93.5	6.7	10.2	15.02	9.77
94.0	6.6	10.1	15.17	9.89
94.5	6.5	10.0	15.32	10.01
95.0	6.5	9.9	15.46	10.13

TABLE 4.--BOLLWORM, HELIOTHIS ZEA (BODDIE) ON COTTON

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
55.0	17.5	84.4	429.2	5.71	1.18	.23
55.5	16.0	80.1	258.7	6.25	1.25	.39
56.0	14.7	76.2	185.2	6.79	1.31	.54
56.5	13.6	72.7	144.2	7.34	1.38	.69
57.0	12.7	69.5	118.1	7.88	1.44	.85
57.5	11.9	66.6	100.0	8.42	1.50	1.00
58.0	11.2	63.9	86.7	8.96	1.57	1.15
58.5	10.5	61.4	76.5	9.51	1.63	1.31
59.0	10.0	59.1	68.4	10.05	1.69	1.46

TABLE 4.--BOLLWORM, HELIOTHIS ZEA (BODDIE) ON COTTON--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
59.5	9.4	56.9	61.9	10.59	1.76	1.61
60.0	9.0	54.9	58.5	11.13	1.82	1.77
60.5	8.6	53.1	52.0	11.68	1.88	1.92
61.0	8.2	51.4	48.2	12.22	1.95	2.07
61.5	7.8	49.7	44.9	12.76	2.01	2.23
62.0	7.5	48.2	42.0	13.30	2.07	2.38
62.5	7.2	46.8	39.4	13.85	2.14	2.54
63.0	6.9	45.4	37.2	14.39	2.20	2.69
63.5	6.7	44.2	35.2	14.93	2.26	2.84
64.0	6.5	43.0	33.4	15.47	2.33	3.00
64.5	6.2	41.8	31.8	16.02	2.39	3.15
65.0	6.0	40.7	30.3	16.56	2.45	3.30
65.5	5.8	39.7	28.9	17.10	2.52	3.46
66.0	5.7	38.7	27.7	17.64	2.58	3.61
66.5	5.5	37.8	26.6	18.19	2.65	3.76
67.0	5.3	36.9	25.5	18.73	2.71	3.92
67.5	5.2	36.1	24.6	19.27	2.77	4.07
68.0	5.0	35.3	23.7	19.81	2.84	4.22
68.5	4.9	34.5	22.8	20.36	2.90	4.38
69.0	4.8	33.7	22.1	20.90	2.96	4.53
69.5	4.7	33.0	21.3	21.44	3.03	4.68
70.0	4.5	32.4	20.7	21.98	3.09	4.84
70.5	4.4	31.7	20.0	22.53	3.15	4.99
71.0	4.3	31.1	19.4	23.07	3.22	5.14
71.5	4.2	30.5	18.9	23.61	3.28	5.30
72.0	4.1	29.9	18.3	24.15	3.34	5.45
72.5	4.0	29.3	17.8	24.70	3.41	5.61
73.0	4.0	28.8	17.4	25.24	3.47	5.76
73.5	3.9	28.3	16.9	25.78	3.53	5.91
74.0	3.8	27.8	16.5	26.32	3.60	6.07
74.5	3.7	27.3	16.1	26.87	3.66	6.22
75.0	3.6	26.8	15.7	27.41	3.72	6.37
75.5	3.6	26.4	15.3	27.95	3.79	6.53
76.0	3.5	26.0	15.0	28.49	3.85	6.68
76.5	3.4	25.5	14.6	29.04	3.92	6.83
77.0	3.4	25.1	14.3	29.58	3.98	6.99
77.5	3.3	24.7	14.0	30.12	4.04	7.14
78.0	3.3	24.4	13.7	30.66	4.11	7.29
78.5	3.2	24.0	13.4	31.21	4.17	7.45
79.0	3.1	23.6	13.2	31.75	4.23	7.60
79.5	3.1	23.3	12.9	32.29	4.30	7.75
80.0	3.0	22.9	12.6	32.84	4.36	7.91
80.5	3.0	22.6	12.4	33.38	4.42	8.06
81.0	2.9	22.3	12.2	33.92	4.49	8.21
81.5	2.9	22.0	11.9	34.46	4.55	8.37
82.0	2.9	21.7	11.7	35.00	4.61	8.52
82.5	2.8	21.4	11.5	35.55	4.68	8.68
83.0	2.8	21.1	11.3	36.09	4.74	8.83
83.5	2.7	20.8	11.1	36.63	4.80	8.98
84.0	2.7	20.5	10.9	37.17	4.87	9.14
84.5	2.7	20.3	10.8	37.72	4.93	9.29
85.0	2.6	20.0	10.6	38.26	4.99	9.44
85.5	2.6	19.8	10.4	38.80	5.06	9.60
86.0	2.5	19.5	10.3	39.34	5.12	9.75
86.5	2.5	19.3	10.1	39.89	5.19	9.90
87.0	2.5	19.1	9.9	40.43	5.25	10.06
87.5	2.4	18.8	9.8	40.97	5.31	10.21
88.0	2.4	18.6	9.6	41.51	5.38	10.36
88.5	2.4	18.4	9.5	42.06	5.44	10.52

TABLE 4.--BOLLWORM, HELIOTHIS ZEA (BODDIE) ON COTTON--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
89.0	2.3	18.2	9.4	42.60	5.50	10.67
89.5	2.3	18.0	9.2	43.14	5.57	10.82
90.0	2.3	17.8	9.1	43.68	5.63	10.98
90.5	2.3	17.6	9.0	44.23	5.69	11.13
91.0	2.2	17.4	8.9	44.77	5.76	11.28
91.5	2.2	17.2	8.7	45.31	5.82	11.44
92.0	2.2	17.0	8.6	45.85	5.88	11.59
92.5	2.2	16.8	8.5	46.40	5.95	11.75
93.0	2.1	16.6	8.4	46.94	6.01	11.90
93.5	2.1	16.5	8.3	47.48	6.07	12.05
94.0	2.1	16.3	8.2	48.02	6.14	12.21
94.5	2.1	16.1	8.1	48.57	6.20	12.36
95.0	2.0	16.0	8.0	49.11	6.26	12.51

TABLE 5.--CABBAGE LOOPER, TRICHOPLUSIA NI (HUBNER)

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
55.0	13.0	109.8	2631.6	7.66	.91	.04
55.5	12.2	95.4	306.3	8.19	1.05	.33
56.0	11.5	84.4	162.6	8.72	1.18	.61
56.5	10.8	75.6	110.7	9.25	1.32	.90
57.0	10.2	68.5	83.9	9.78	1.46	1.19
57.5	9.7	62.7	67.5	10.32	1.60	1.48
58.0	9.2	57.7	56.5	10.85	1.73	1.77
58.5	8.8	53.5	48.6	11.38	1.87	2.06
59.0	8.4	49.8	42.6	11.91	2.01	2.35
59.5	8.0	46.6	38.0	12.44	2.14	2.63
60.0	7.7	43.8	34.2	12.97	2.28	2.92
60.5	7.4	41.4	31.1	13.50	2.42	3.21
61.0	7.1	39.1	28.6	14.03	2.55	3.50
61.5	6.9	37.1	26.4	14.56	2.69	3.79
62.0	6.6	35.3	24.5	15.09	2.83	4.08
62.5	6.4	33.7	22.9	15.62	2.97	4.37
63.0	6.2	32.2	21.5	16.15	3.10	4.65
63.5	6.0	30.9	20.2	16.68	3.24	4.94
64.0	5.8	29.6	19.1	17.21	3.38	5.23
64.5	5.6	28.5	18.1	17.74	3.51	5.52
65.0	5.5	27.4	17.2	18.27	3.65	5.81
65.5	5.3	26.4	16.4	18.80	3.79	6.10
66.0	5.2	25.5	15.7	19.33	3.92	6.38
66.5	5.0	24.6	15.0	19.86	4.06	6.67
67.0	4.9	23.8	14.4	20.39	4.20	6.96
67.5	4.8	23.1	13.8	20.93	4.34	7.25
68.0	4.7	22.4	13.3	21.46	4.47	7.54
68.5	4.5	21.7	12.8	21.99	4.61	7.83
69.0	4.4	21.1	12.3	22.52	4.75	8.12
69.5	4.3	20.5	11.9	23.05	4.88	8.40
70.0	4.2	19.9	11.5	23.58	5.02	8.69
70.5	4.1	19.4	11.1	24.11	5.16	8.98
71.0	4.1	18.9	10.8	24.64	5.29	9.27
71.5	4.0	18.4	10.5	25.17	5.43	9.56
72.0	3.9	18.0	10.2	25.71	5.57	9.85
72.5	3.8	17.5	9.9	26.23	5.71	10.14

TABLE 5.--CABBAGE LOOPER, TRICHOPLUSIA NI (HUBNER)--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
73.0	3.7	17.1	9.6	26.76	5.84	10.42
73.5	3.7	16.7	9.3	27.29	5.98	10.71
74.0	3.6	16.3	9.1	27.82	6.12	11.00
74.5	3.5	16.0	8.9	28.35	6.25	11.29
75.0	3.5	15.6	8.6	28.88	6.39	11.58
75.5	3.4	15.3	8.4	29.41	6.53	11.87
76.0	3.3	15.0	8.2	29.94	6.66	12.15
76.5	3.3	14.7	8.0	30.47	6.80	12.44
77.0	3.2	14.4	7.9	31.00	6.94	12.73
77.5	3.2	14.1	7.7	31.54	7.08	13.02
78.0	3.1	13.9	7.5	32.07	7.21	13.31
78.5	3.1	13.6	7.4	32.60	7.35	13.60
79.0	3.0	13.4	7.2	33.13	7.49	13.89
79.5	3.0	13.1	7.1	33.66	7.62	14.17
80.0	2.9	12.9	6.9	34.19	7.76	14.46
80.5	2.9	12.7	6.8	34.72	7.90	14.75
81.0	2.8	12.4	6.6	35.25	8.03	15.04
81.5	2.8	12.2	6.5	35.78	8.17	15.33
82.0	2.8	12.0	6.4	36.31	8.31	15.62
82.5	2.7	11.8	6.3	36.84	8.45	15.91
83.0	2.7	11.7	6.2	37.37	8.58	16.19
83.5	2.6	11.5	6.1	37.90	8.72	16.48
84.0	2.6	11.3	6.0	38.43	8.86	16.77
84.5	2.6	11.1	5.9	38.96	8.99	17.06
85.0	2.5	11.0	5.8	39.49	9.13	17.35
85.5	2.5	10.8	5.7	40.02	9.27	17.64
86.0	2.5	10.6	5.6	40.55	9.40	17.92
86.5	2.4	10.5	5.5	41.08	9.54	18.21
87.0	2.4	10.3	5.4	41.61	9.68	18.50
87.5	2.4	10.2	5.3	42.15	9.82	18.79
88.0	2.3	10.0	5.2	42.68	9.95	19.08
88.5	2.3	9.9	5.2	43.21	10.09	19.37
89.0	2.3	9.8	5.1	43.74	10.23	19.66
89.5	2.3	9.6	5.0	44.27	10.36	19.94
90.0	2.2	9.5	4.9	44.80	10.50	20.23
90.5	2.2	9.4	4.9	45.33	10.64	20.52
91.0	2.2	9.3	4.8	45.86	10.77	20.81
91.5	2.2	9.2	4.7	46.39	10.91	21.10
92.0	2.1	9.1	4.7	46.92	11.05	21.39
92.5	2.1	8.9	4.6	47.45	11.19	21.68
93.0	2.1	8.8	4.6	47.98	11.32	21.96
93.5	2.1	8.7	4.5	48.51	11.46	22.25
94.0	2.0	8.6	4.4	49.04	11.60	22.54
94.5	2.0	8.5	4.4	49.57	11.73	22.83
95.0	2.0	8.4	4.3	50.10	11.87	23.12

TABLE 6.--COTTON LEAFPERFORATOR, BUCCULATRIX THURBERIELLA BUSCK.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
55.0	28.5	96.4	-74.4	3.51	1.04	-1.34
55.5	26.3	77.2	-101.3	3.80	1.30	-.99
56.0	24.5	64.4	-158.7	4.09	1.55	-.63
56.5	22.3	55.2	-369.3	4.38	1.81	-.27
57.0	21.4	48.3	1190.5	4.66	2.07	.08

TABLE 6.--COTTON LEAFPERFORATOR, BUCCULATRIX THURBERIELLA BUSCK.--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
57.5	20.2	43.3	226.3	4.95	2.33	.44
58.0	19.1	34.7	125.3	5.24	2.59	.80
58.5	18.1	35.2	86.5	5.53	2.84	1.15
59.0	17.2	32.3	66.1	5.82	3.10	1.51
59.5	16.4	29.3	53.5	6.11	3.36	1.87
60.0	15.6	27.6	44.9	6.40	3.62	2.23
60.5	15.0	25.8	38.7	6.68	3.88	2.58
61.0	14.3	24.2	34.0	6.97	4.13	2.94
61.5	13.8	22.8	30.3	7.26	4.39	3.30
62.0	13.2	21.5	27.4	7.55	4.65	3.65
62.5	12.8	20.4	24.9	7.84	4.91	4.01
63.0	12.3	19.4	22.9	8.13	5.17	4.37
63.5	11.9	18.4	21.2	8.41	5.42	4.72
64.0	11.5	17.6	19.7	8.70	5.68	5.08
64.5	11.1	16.8	18.4	8.99	5.94	5.44
65.0	10.8	16.1	17.3	9.28	6.20	5.80
65.5	10.5	15.5	16.3	9.57	6.45	6.15
66.0	10.1	14.9	15.4	9.86	6.71	6.51
66.5	9.9	14.3	14.6	10.15	6.97	6.87
67.0	9.6	13.8	13.8	10.43	7.23	7.22
67.5	9.3	13.4	13.2	10.72	7.49	7.58
68.0	9.1	12.9	12.6	11.01	7.74	7.94
68.5	8.8	12.5	12.1	11.30	8.00	8.29
69.0	8.6	12.1	11.6	11.59	8.26	8.65
69.5	8.4	11.7	11.1	11.88	8.52	9.01
70.0	8.2	11.4	10.7	12.16	8.78	9.37
70.5	8.0	11.1	10.3	12.45	9.03	9.72
71.0	7.8	10.8	9.9	12.74	9.29	10.08
71.5	7.7	10.5	9.5	13.03	9.55	10.44
72.0	7.5	10.2	9.3	13.32	9.81	10.79
72.5	7.3	9.9	9.0	13.61	10.07	11.15
73.0	7.2	9.7	8.7	13.90	10.32	11.51
73.5	7.0	9.4	8.4	14.18	10.58	11.86
74.0	6.9	9.2	8.2	14.47	10.84	12.22
74.5	6.8	9.0	7.9	14.76	11.10	12.58
75.0	6.6	8.8	7.7	15.05	11.36	12.94
75.5	6.5	8.6	7.5	15.34	11.61	13.29
76.0	6.4	8.4	7.3	15.63	11.87	13.65
76.5	6.3	8.2	7.1	15.92	12.13	14.01
77.0	6.2	8.1	7.0	16.20	12.39	14.36
77.5	6.1	7.9	6.8	16.49	12.65	14.72
78.0	6.0	7.7	6.6	16.78	12.90	15.08
78.5	5.9	7.6	6.5	17.07	13.16	15.43
79.0	5.8	7.5	6.3	17.36	13.42	15.79
79.5	5.7	7.3	6.2	17.65	13.68	16.15
80.0	5.6	7.2	6.1	17.93	13.94	16.51
80.5	5.5	7.0	5.9	18.22	14.19	16.86
81.0	5.4	6.9	5.8	18.51	14.45	17.22
81.5	5.3	6.8	5.7	18.80	14.71	17.58
82.0	5.2	6.7	5.6	19.09	14.97	17.93
82.5	5.2	6.6	5.5	19.38	15.23	18.29
83.0	5.1	6.5	5.4	19.67	15.48	18.65
83.5	5.0	6.4	5.3	19.95	15.74	19.00
84.0	4.9	6.2	5.2	20.24	16.00	19.36
84.5	4.9	6.2	5.1	20.53	16.26	19.72
85.0	4.8	6.1	5.0	20.82	16.52	20.08
85.5	4.7	6.0	4.9	21.11	16.77	20.43
86.0	4.7	5.9	4.8	21.40	17.03	20.79
86.5	4.6	5.8	4.7	21.69	17.29	21.15

TABLE 6.--COTTON LEAFPERFORATOR, BUCCULATRIX THURBERIELLA BUSCK.--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
87.0	4.6	5.7	4.7	21.97	17.55	21.50
87.5	4.5	5.6	4.6	22.26	17.81	21.86
88.0	4.4	5.6	4.6	22.55	18.06	22.22
88.5	4.4	5.5	4.4	22.84	18.32	22.57
89.0	4.3	5.4	4.4	23.13	18.58	22.93
89.5	4.3	5.3	4.3	23.42	18.84	23.29
90.0	4.2	5.2	4.2	23.70	19.10	23.65
90.5	4.2	5.2	4.2	23.99	19.35	24.00
91.0	4.1	5.1	4.1	24.28	19.61	24.36
91.5	4.1	5.0	4.0	24.57	19.87	24.72
92.0	4.1	5.0	4.0	24.86	20.13	25.07
92.5	4.0	4.9	3.9	25.15	20.39	25.43
93.0	3.9	4.8	3.9	25.44	20.64	25.79
93.5	3.9	4.8	3.8	25.72	20.90	26.14
94.0	3.8	4.7	3.8	26.01	21.16	26.50
94.5	3.8	4.7	3.7	26.30	21.42	26.86
95.0	3.8	4.6	3.7	26.59	21.68	27.22

TABLE 7.--LYGUS DESERTUS KNIGHT

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY

	DURATION		PERCENT	
TEMP-F	EGG	NYMPHAL	EGG	NYMPHAL
55.0	85.3	147.5	1.17	.68
55.5	71.1	122.2	1.41	.82
56.0	61.0	104.3	1.64	.96
56.5	53.4	91.0	1.87	1.10
57.0	47.4	80.6	2.11	1.24
57.5	42.7	72.4	2.34	1.38
58.0	38.8	65.7	2.58	1.52
58.5	35.6	60.2	2.81	1.66
59.0	32.9	55.5	3.04	1.80
59.5	30.5	51.5	3.28	1.94
60.0	28.5	48.0	3.51	2.08
60.5	26.7	45.0	3.75	2.22
61.0	25.1	42.3	3.98	2.36
61.5	23.7	39.9	4.21	2.50
62.0	22.5	37.8	4.45	2.64
62.5	21.4	35.9	4.68	2.79
63.0	20.3	34.2	4.92	2.93
63.5	19.4	32.6	5.15	3.07
64.0	18.6	31.2	5.38	3.21
64.5	17.8	29.9	5.62	3.35
65.0	17.1	28.7	5.85	3.49
65.5	16.4	27.6	6.09	3.63
66.0	15.8	26.5	6.32	3.77
66.5	15.3	25.6	6.55	3.91
67.0	14.7	24.7	6.79	4.05
67.5	14.2	23.9	7.02	4.19
68.0	13.8	23.1	7.26	4.33
68.5	13.4	22.4	7.49	4.47
69.0	12.9	21.7	7.72	4.61
69.5	12.6	21.0	7.96	4.75
70.0	12.2	20.4	8.19	4.89

TABLE 7.--LYGUS DESERTUS KNIGHT--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY

	DURATION		PERCENT	
TEMP-F	EGG	NYMPHAL	EGG	NYMPHAL
70.5	11.9	19.4	8.43	5.03
71.0	11.5	19.3	8.66	5.17
71.5	11.2	18.8	8.89	5.31
72.0	11.0	18.3	9.13	5.45
72.5	10.7	17.9	9.36	5.60
73.0	10.4	17.4	9.60	5.74
73.5	10.2	17.0	9.83	5.88
74.0	9.9	16.6	10.06	6.02
74.5	9.7	16.2	10.30	6.16
75.0	9.5	15.9	10.53	6.30
75.5	9.3	15.5	10.77	6.44
76.0	9.1	15.2	11.00	6.58
76.5	8.9	14.9	11.23	6.72
77.0	8.7	14.6	11.47	6.86
77.5	8.5	14.3	11.70	7.00
78.0	8.4	14.0	11.94	7.14
78.5	8.2	13.7	12.17	7.28
79.0	8.1	13.5	12.40	7.42
79.5	7.9	13.2	12.64	7.56
80.0	7.8	13.0	12.87	7.70
80.5	7.6	12.7	13.11	7.84
81.0	7.5	12.5	13.34	7.98
81.5	7.4	12.3	13.57	8.12
82.0	7.3	12.1	13.81	8.26
82.5	7.1	11.9	14.04	8.41
83.0	7.0	11.7	14.28	8.55
83.5	6.9	11.5	14.51	8.69
84.0	6.8	11.3	14.74	8.83
84.5	6.7	11.2	14.98	8.97
85.0	6.6	11.0	15.21	9.11
85.5	6.5	10.8	15.45	9.25
86.0	6.4	10.7	15.68	9.39
86.5	6.3	10.5	15.91	9.53
87.0	6.2	10.3	16.15	9.67
87.5	6.1	10.2	16.38	9.81
88.0	6.0	10.0	16.62	9.95
88.5	5.9	9.8	16.85	10.09
89.0	5.9	9.7	17.08	10.23
89.5	5.8	9.6	17.32	10.37
90.0	5.7	9.5	17.55	10.51
90.5	5.6	9.4	17.79	10.65
91.0	5.5	9.3	18.02	10.79
91.5	5.5	9.1	18.25	10.93
92.0	5.4	9.0	18.49	11.07
92.5	5.3	8.9	18.72	11.22
93.0	5.3	8.8	18.96	11.36
93.5	5.2	8.7	19.19	11.50
94.0	5.1	8.6	19.42	11.64
94.5	5.1	8.5	19.66	11.78
95.0	5.0	8.4	19.89	11.92

TABLE 8.--*LYGUS HESPERUS* KNIGHT

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY

	DURATION		PERCENT	
TEMP-F	EGG	NYMPHAL	EGG	NYMPHAL
55.0	27.8	51.0	3.60	1.96
55.5	26.4	48.6	3.78	2.06
56.0	25.2	46.5	3.97	2.15
56.5	24.1	44.5	4.15	2.25
57.0	23.	42.7	4.34	2.34
57.5	22.1	41.0	4.53	2.44
58.0	21.2	39.5	4.71	2.53
58.5	20.4	38.0	4.90	2.63
59.0	19.7	36.7	5.08	2.72
59.5	19.0	35.5	5.27	2.82
60.0	18.3	34.3	5.46	2.92
60.5	17.7	33.2	5.64	3.01
61.0	17.2	32.2	5.83	3.11
61.5	16.6	31.2	6.01	3.20
62.0	16.1	30.3	6.20	3.30
62.5	15.7	29.5	6.39	3.39
63.0	15.2	28.7	6.57	3.49
63.5	14.8	27.9	6.76	3.58
64.0	14.4	27.2	6.94	3.68
64.5	14.0	26.5	7.13	3.78
65.0	13.7	25.8	7.32	3.87
65.5	13.3	25.2	7.50	3.97
66.0	13.	24.6	7.69	4.06
66.5	12.7	24.1	7.87	4.16
67.0	12.4	23.5	8.06	4.25
67.5	12.1	23.0	8.25	4.35
68.0	11.9	22.5	8.43	4.44
68.5	11.6	22.1	8.62	4.54
69.0	11.4	21.6	8.80	4.63
69.5	11.1	21.1	8.99	4.73
70.0	10.9	20.7	9.18	4.83
70.5	10.7	20.3	9.36	4.92
71.0	10.5	19.9	9.55	5.02
71.5	10.3	19.5	9.73	5.11
72.0	10.1	19.2	9.92	5.21
72.5	9.9	18.9	10.11	5.30
73.0	9.7	18.5	10.29	5.40
73.5	9.5	18.2	10.48	5.49
74.0	9.3	17.9	10.66	5.59
74.5	9.2	17.6	10.85	5.69
75.0	9.0	17.3	11.04	5.78
75.5	8.8	17.0	11.22	5.88
76.0	8.6	16.7	11.41	5.97
76.5	8.5	16.5	11.59	6.07
77.0	8.3	16.2	11.78	6.16
77.5	8.2	16.0	11.97	6.26
78.0	8.0	15.7	12.15	6.35
78.5	7.9	15.5	12.34	6.45
79.0	7.7	15.3	12.52	6.54
79.5	7.6	15.1	12.71	6.64
80.0	7.4	14.8	12.90	6.74
80.5	7.3	14.6	13.08	6.83
81.0	7.2	14.4	13.27	6.93
81.5	7.0	14.2	13.45	7.02
82.0	6.9	14.0	13.64	7.12
82.5	6.8	13.8	13.83	7.21
83.0	6.7	13.7	14.01	7.31
83.5	6.	13.5	14.20	7.40
84.0	6.	13.3	14.38	7.50

TABLE 8.--LYGUS HESPERUS KNIGHT--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY

	DURATION		PERCENT	
TEMP-F	EGG	NYMPHAL	EGG	NYMPHAL
84.5	6.9	13.2	14.57	7.69
85.0	6.8	13.1	14.76	7.69
85.5	6.7	12.8	14.94	7.79
86.0	6.6	12.7	15.13	7.88
86.5	6.5	12.5	15.31	7.98
87.0	6.5	12.4	15.50	8.07
87.5	6.4	12.2	15.69	8.17
88.0	6.3	12.1	15.87	8.26
88.5	6.2	12.0	16.06	8.36
89.0	6.2	11.8	16.24	8.45
89.5	6.1	11.7	16.43	8.55
90.0	6.0	11.6	16.62	8.65
90.5	6.0	11.4	16.80	8.74
91.0	5.9	11.3	16.99	8.84
91.5	5.8	11.2	17.17	8.93
92.0	5.8	11.1	17.36	9.03
92.5	5.7	11.0	17.55	9.12
93.0	5.6	10.8	17.73	9.22
93.5	5.6	10.7	17.92	9.31
94.0	5.5	10.6	18.10	9.41
94.5	5.5	10.5	18.29	9.51
95.0	5.4	10.4	18.48	9.60

TABLE 9.--PINK BOLLWORM, PECTINOPHORA GOSSYPIELLA (SAUND)

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
55.0	41.4	-917.4	1351.4	2.42	-.11	.07
55.5	36.4	4000.0	359.1	2.75	.00	.28
56.0	32.5	877.2	207.0	3.08	.11	.48
56.5	29.4	443.5	145.5	3.41	.23	.69
57.0	26.8	296.7	112.1	3.73	.34	.89
57.5	24.6	223.0	91.2	4.06	.45	1.10
58.0	22.8	178.6	76.9	4.39	.56	1.30
58.5	21.2	148.9	66.4	4.72	.67	1.51
59.0	19.8	127.7	58.5	5.05	.78	1.71
59.5	18.6	111.8	52.2	5.38	.89	1.91
60.0	17.5	99.4	47.2	5.71	1.01	2.12
60.5	16.6	89.5	43.0	6.04	1.12	2.32
61.0	15.7	81.4	39.6	6.37	1.23	2.53
61.5	14.9	74.6	36.6	6.70	1.34	2.73
62.0	14.2	68.9	34.0	7.02	1.45	2.94
62.5	13.6	64.0	31.6	7.35	1.56	3.14
63.0	13.0	59.7	29.9	7.68	1.67	3.35
63.5	12.5	56.0	28.2	8.01	1.79	3.55
64.0	12.0	52.7	26.6	8.34	1.90	3.75
64.5	11.5	49.8	25.3	8.67	2.01	3.96
65.0	11.1	47.1	24.0	9.00	2.12	4.16
65.5	10.7	44.8	22.9	9.33	2.23	4.37
66.0	10.4	42.7	21.9	9.66	2.34	4.57
66.5	10.0	40.7	20.9	9.98	2.46	4.78
67.0	9.7	39.0	20.1	10.31	2.57	4.98
67.5	9.4	37.3	19.3	10.64	2.68	5.19
68.0	9.1	35.8	18.5	10.97	2.79	5.39

TABLE 9.--PINK BOLLWORM, PECTINOPHORA GOSSYPIELLA (SAUND)--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
69.5	8.8	34.5	17.9	11.30	2.90	5.60
69.[illegible]	8.6	33.2	17.[illegible]	11.63	3.01	5.80
69.5	8.4	32.[illegible]	16.7	11.96	3.12	6.00
70.[illegible]	8.1	31.[illegible]	16.1	12.29	3.24	6.21
70.5	7.9	30.9	15.6	12.62	3.35	6.41
71.[illegible]	7.7	28.9	15.1	12.95	3.46	6.62
71.5	7.5	28.[illegible]	14.7	13.27	3.57	6.82
72.[illegible]	7.4	27.2	14.[illegible]	13.60	3.68	7.03
72.5	7.2	26.4	13.8	13.93	3.79	7.23
73.[illegible]	7.[illegible]	25.5	13.4	14.26	3.90	7.44
73.5	6.9	24.9	13.1	14.59	4.02	7.64
74.[illegible]	6.7	24.2	12.7	14.92	4.13	7.84
74.5	6.6	23.6	12.4	15.25	4.24	8.05
75.[illegible]	6.4	23.[illegible]	12.1	15.58	4.35	8.25
75.5	6.3	22.4	11.8	15.91	4.46	8.46
76.[illegible]	6.2	21.9	11.5	16.24	4.57	8.66
76.5	6.[illegible]	21.3	11.3	16.56	4.69	8.87
77.[illegible]	5.9	20.8	11.[illegible]	16.89	4.80	9.07
77.5	5.8	20.4	10.[illegible]	17.22	4.91	9.28
78.[illegible]	5.7	19.9	10.5	17.55	5.02	9.48
78.5	5.6	19.5	10.3	17.88	5.13	9.69
79.[illegible]	5.5	19.1	10.1	18.21	5.24	9.89
79.5	5.4	18.7	9.9	18.54	5.35	10.09
80.[illegible]	5.3	18.3	9.7	18.87	5.47	10.30
80.5	5.2	17.9	9.5	19.20	5.58	10.50
81.[illegible]	5.1	17.[illegible]	9.3	19.53	5.69	10.71
81.5	5.[illegible]	17.2	9.2	19.85	5.80	10.91
82.[illegible]	5.[illegible]	16.[illegible]	9.[illegible]	20.18	5.91	11.12
82.5	4.[illegible]	16.6	8.[illegible]	20.51	6.02	11.32
83.[illegible]	4.8	16.3	8.7	20.84	6.13	11.53
83.5	4.7	16.[illegible]	8.5	21.17	6.25	11.73
84.[illegible]	4.7	15.7	8.4	21.50	6.36	11.93
84.5	4.6	15.5	8.[illegible]	21.83	6.47	12.14
85.[illegible]	4.5	15.2	8.1	22.16	6.58	12.34
85.5	4.4	14.9	8.[illegible]	22.49	6.69	12.55
86.[illegible]	4.4	14.7	7.8	22.82	6.80	12.75
86.5	4.3	14.5	7.7	23.14	6.92	12.96
87.[illegible]	4.3	14.2	7.[illegible]	23.47	7.03	13.16
87.5	4.2	14.[illegible]	7.5	23.80	7.14	13.37
88.[illegible]	4.1	13.8	7.4	24.13	7.25	13.57
88.5	4.1	13.6	7.3	24.46	7.36	13.78
89.[illegible]	4.[illegible]	13.4	7.2	24.79	7.47	13.98
89.5	4.[illegible]	13.2	7.[illegible]	25.12	7.58	14.18
90.[illegible]	3.9	13.[illegible]	6.9	25.45	7.70	14.39
90.5	3.9	12.8	6.9	25.78	7.81	14.59
91.[illegible]	3.8	12.6	6.8	26.11	7.92	14.80
91.5	3.8	12.5	6.7	26.43	8.03	15.00
92.[illegible]	3.7	12.3	6.6	26.76	8.14	15.21
92.5	3.7	12.1	6.5	27.09	8.25	15.41
93.[illegible]	3.6	12.[illegible]	6.4	27.42	8.36	15.62
93.5	3.6	11.8	6.3	27.75	8.48	15.82
94.[illegible]	3.6	11.6	6.2	28.08	8.59	16.02
94.5	3.5	11.5	6.2	28.41	8.70	16.23
95.[illegible]	3.5	11.3	6.1	28.74	8.81	16.43

TABLE 10.--TOBACCO BUDWORM, HELIOTHIS VIRESCENS (F.)

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
55.[illegible]	17.9	108.9	291.9	5.58	.92	.34
55.5	16.4	96.7	265.3	6.11	1.03	.49
56.[illegible]	15.1	87.0	158.3	6.63	1.15	.63
56.5	14.0	79.0	128.[illegible]	7.16	1.27	.78
57.[illegible]	13.[illegible]	72.4	108.6	7.69	1.38	.92
57.5	12.2	66.8	93.9	8.21	1.50	1.07
58.[illegible]	11.4	62.0	82.7	8.74	1.61	1.21
58.5	10.8	57.8	73.4	9.27	1.73	1.35
59.[illegible]	10.2	54.2	66.7	9.79	1.85	1.50
59.5	9.7	51.0	[illegible].9	10.32	1.96	1.64
60.0	9.2	48.1	55.4	10.85	2.08	1.79
60.5	8.8	45.6	51.8	11.38	2.19	1.93
61.[illegible]	8.4	43.3	48.2	11.90	2.31	2.08
61.5	8.0	41.2	45.0	12.43	2.43	2.22
62.[illegible]	7.7	39.3	42.3	12.96	2.54	2.37
62.5	7.4	37.6	39.8	13.48	2.66	2.51
63.[illegible]	7.1	36.0	37.7	14.01	2.77	2.65
63.5	6.9	34.6	35.7	14.54	2.89	2.80
64.[illegible]	6.6	33.3	34.0	15.06	3.01	2.94
64.5	6.4	32.0	32.4	15.59	3.12	3.09
65.0	6.2	30.9	30.9	16.12	3.24	3.23
65.5	6.0	29.8	29.[illegible]	16.65	3.35	3.38
66.[illegible]	5.8	28.8	28.4	17.17	3.47	3.52
66.5	5.6	27.9	27.3	17.70	3.59	3.67
67.[illegible]	5.5	27.0	26.2	18.23	3.70	3.81
67.5	5.3	26.2	25.[illegible]	18.75	3.82	3.96
68.[illegible]	5.2	25.4	24.4	19.28	3.93	4.10
68.5	5.0	24.7	23.6	19.81	4.05	4.24
69.[illegible]	4.9	24.[illegible]	22.8	20.33	4.17	4.39
69.5	4.8	23.4	22.1	20.86	4.28	4.53
70.[illegible]	4.7	22.7	21.4	21.39	4.40	4.68
70.5	4.6	22.2	21.7	21.92	4.51	4.82
71.[illegible]	4.5	21.6	20.1	22.44	4.63	4.97
71.5	4.4	21.1	19.[illegible]	22.97	4.75	5.11
72.[illegible]	4.3	20.6	19.[illegible]	23.50	4.86	5.26
72.5	4.2	20.1	18.5	24.02	4.98	5.40
73.[illegible]	4.1	19.6	18.[illegible]	24.55	5.09	5.54
73.5	4.[illegible]	19.2	17.6	25.08	5.21	5.69
74.[illegible]	3.9	18.8	17.1	25.60	5.33	5.83
74.5	3.8	18.4	16.7	26.13	5.44	5.98
75.[illegible]	3.8	18.0	16.[illegible]	26.66	5.56	6.12
75.[illegible]	3.7	17.6	16.0	27.19	5.67	6.27
76.0	3.6	17.3	15.6	27.71	5.79	6.41
76.5	3.5	16.9	15.3	28.24	5.91	6.56
77.[illegible]	3.5	16.6	14.9	28.77	6.02	6.70
77.5	3.4	16.3	14.5	29.29	6.14	6.85
78.[illegible]	3.4	16.[illegible]	14.[illegible]	29.82	6.25	6.99
78.[illegible]	3.[illegible]	15.7	14.[illegible]	30.35	6.37	7.13
79.[illegible]	3.2	15.4	13.7	30.87	6.49	7.28
79.5	3.2	15.1	13.[illegible]	31.40	6.60	7.42
80.[illegible]	3.1	14.[illegible]	13.[illegible]	31.93	6.72	7.57
80.[illegible]	3.1	14.6	13.[illegible]	32.45	6.83	7.71
81.[illegible]	3.[illegible]	14.4	13.7	32.98	6.95	7.86
81.5	3.[illegible]	14.2	12.[illegible]	33.51	7.07	8.00
82.[illegible]	2.[illegible]	13.[illegible]	12.[illegible]	34.04	7.18	8.15
82.[illegible]	2.[illegible]	13.7	12.[illegible]	34.56	7.30	8.29
83.[illegible]	2.[illegible]	13.5	11.[illegible]	35.09	7.41	8.43
83.[illegible]	2.[illegible]	13.3	11.7	35.62	7.53	8.58
84.[illegible]	2.[illegible]	13.1	11.[illegible]	36.14	7.65	8.72

TABLE 10.--TOBACCO BUDWORM, HELIOTHIS VIRESCENS (F.)--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
94.5	2.7	12.9	11.3	36.67	7.76	8.87
95.0	2.7	12.7	11.1	37.20	7.88	9.01
95.5	2.7	12.5	10.9	37.73	7.99	9.16
96.0	2.6	12.3	10.8	38.25	8.11	9.30
96.5	2.6	12.2	10.6	38.78	8.23	9.45
97.0	2.5	12.0	10.4	39.31	8.34	9.59
97.5	2.5	11.8	10.3	39.83	8.46	9.74
98.0	2.5	11.7	10.1	40.36	8.57	9.88
98.5	2.4	11.5	10.0	40.89	8.69	10.02
99.0	2.4	11.4	9.8	41.41	8.81	10.17
99.5	2.4	11.2	9.7	41.94	8.92	10.31
100.0	2.4	11.1	9.6	42.47	9.04	10.46
100.5	2.3	10.9	9.4	43.00	9.15	10.60
101.0	2.3	10.8	9.3	43.52	9.27	10.75
101.5	2.3	10.7	9.2	44.05	9.39	10.89
102.0	2.2	10.5	9.1	44.58	9.50	11.04
102.5	2.2	10.4	8.9	45.10	9.62	11.18
103.0	2.2	10.3	8.8	45.63	9.73	11.32
103.5	2.2	10.2	8.7	46.16	9.85	11.47
104.0	2.1	10.0	8.6	46.68	9.97	11.61
104.5	2.1	9.9	8.5	47.21	10.08	11.76
105.0	2.1	9.8	8.4	47.74	10.20	11.90

TABLE 11.--WHITEFLY, TRIALEURODES ABUTILONEA (HALDEMAN)

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
55.0	21.4	51.3	3.5	4.67	1.95	28.51
55.5	20.5	49.2	3.5	4.87	2.03	28.79
56.0	19.7	47.4	3.4	5.07	2.11	29.07
56.5	19.1	45.8	3.4	5.26	2.19	29.36
57.0	18.3	44.0	3.4	5.46	2.27	29.64
57.5	17.7	42.5	3.3	5.66	2.35	29.92
58.0	17.1	41.1	3.3	5.86	2.43	30.21
58.5	16.5	39.8	3.3	6.06	2.51	30.49
59.0	16.0	38.6	3.2	6.25	2.59	30.77
59.5	15.5	37.4	3.2	6.45	2.67	31.05
60.0	15.0	36.4	3.2	6.65	2.75	31.34
60.5	14.6	35.3	3.2	6.85	2.83	31.62
61.0	14.2	34.4	3.1	7.05	2.91	31.90
61.5	13.8	33.4	3.1	7.24	2.99	32.19
62.0	13.4	32.6	3.1	7.44	3.07	32.47
62.5	13.1	31.7	3.1	7.64	3.15	32.75
63.0	12.8	31.0	3.0	7.84	3.23	33.04
63.5	12.4	30.2	3.0	8.04	3.31	33.32
64.0	12.1	29.5	3.0	8.23	3.39	33.60
64.5	11.9	28.8	3.0	8.43	3.47	33.88
65.0	11.6	28.2	2.9	8.63	3.55	34.17
65.5	11.3	27.5	2.9	8.83	3.63	34.45
66.0	11.1	26.9	2.9	9.03	3.71	34.73
66.5	10.8	26.4	2.9	9.22	3.79	35.02
67.0	10.6	25.8	2.8	9.42	3.87	35.30
67.5	10.4	25.3	2.8	9.62	3.95	35.58
68.0	10.2	24.8	2.8	9.82	4.03	35.87

TABLE 11.--WHITEFLY, TRIALEURODES ABUTILONEA (HALDEMAN)--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
68.5	10.0	24.3	2.4	10.02	4.11	36.15
69.0	9.8	23.9	2.7	10.21	4.19	36.43
69.5	9.6	23.4	2.7	10.41	4.27	36.71
70.0	9.4	23.0	2.7	10.61	4.35	37.00
70.5	9.3	22.6	2.7	10.81	4.43	37.28
71.0	9.1	22.2	2.7	11.01	4.51	37.56
71.5	8.9	21.8	2.6	11.20	4.59	37.85
72.0	8.9	21.4	2.6	11.40	4.67	38.13
72.5	8.6	21.1	2.6	11.60	4.75	38.41
73.0	8.5	20.7	2.6	11.80	4.83	38.70
73.5	8.3	20.4	2.6	12.00	4.91	38.98
74.0	8.2	20.0	2.5	12.19	4.99	39.26
74.5	8.1	19.7	2.5	12.39	5.07	39.54
75.0	7.9	19.4	2.5	12.59	5.15	39.83
75.5	7.8	19.1	2.5	12.79	5.23	40.11
76.0	7.7	18.8	2.5	12.99	5.31	40.39
76.5	7.6	18.5	2.5	13.18	5.39	40.68
77.0	7.5	18.3	2.4	13.38	5.47	40.96
77.5	7.4	18.0	2.4	13.58	5.55	41.24
78.0	7.3	17.8	2.4	13.78	5.63	41.53
78.5	7.2	17.5	2.4	13.98	5.71	41.81
79.0	7.1	17.3	2.4	14.17	5.79	42.09
79.5	7.0	17.0	2.4	14.37	5.87	42.37
80.0	6.9	16.8	2.3	14.57	5.95	42.66
80.5	6.8	16.5	2.3	14.77	6.03	42.94
81.0	6.7	16.4	2.3	14.97	6.11	43.22
81.5	6.6	16.2	2.3	15.16	6.19	43.51
82.0	6.5	15.9	2.3	15.36	6.27	43.79
82.5	6.4	15.7	2.3	15.56	6.35	44.07
83.0	6.3	15.5	2.3	15.76	6.43	44.36
83.5	6.3	15.4	2.2	15.96	6.51	44.64
84.0	6.2	15.2	2.2	16.15	6.59	44.92
84.5	6.1	15.0	2.2	16.35	6.67	45.20
85.0	6.0	14.8	2.2	16.55	6.75	45.49
85.5	6.0	14.6	2.2	16.75	6.83	45.77
86.0	5.9	14.5	2.2	16.95	6.91	46.05
86.5	5.8	14.3	2.2	17.14	6.99	46.34
87.0	5.8	14.1	2.1	17.34	7.07	46.62
87.5	5.7	14.0	2.1	17.54	7.15	46.90
88.0	5.6	13.8	2.1	17.74	7.23	47.19
88.5	5.6	13.7	2.1	17.94	7.31	47.47
89.0	5.5	13.5	2.1	18.13	7.39	47.75
89.5	5.5	13.4	2.1	18.33	7.47	48.03
90.0	5.4	13.2	2.1	18.53	7.55	48.32
90.5	5.3	13.1	2.1	18.73	7.63	48.60
91.0	5.3	13.0	2.0	18.93	7.71	48.88
91.5	5.2	12.8	2.0	19.12	7.79	49.17
92.0	5.2	12.7	2.0	19.32	7.87	49.45
92.5	5.1	12.6	2.0	19.52	7.95	49.73
93.0	5.1	12.5	2.0	19.72	8.03	50.02
93.5	5.0	12.3	2.0	19.92	8.11	50.30
94.0	5.0	12.2	2.0	20.11	8.19	50.58
94.5	4.9	12.1	2.0	20.31	8.27	50.86
95.0	4.9	12.0	2.0	20.51	8.35	51.15

TABLE 12.--BIG-EYED BUG, GEOCORIS PALLENS STAL

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY

	DURATION		PERCENT	
TEMP-F	EGG	NYMPHAL	EGG	NYMPHAL
59.0	6[illegible].8	-135.9	.16	-.74
59.5	185.9	-167.4	.53	-.60
60.0	119.4	-217.9	.91	-.46
60.5	78.3	-312.0	1.28	-.32
61.0	60.7	-549.5	1.65	-.18
61.5	49.5	-2298.9	2.02	-.04
62.0	41.8	1052.6	2.39	.09
62.5	36.2	428.3	2.76	.23
63.0	31.9	268.6	3.13	.37
63.5	28.5	195.9	3.50	.51
64.0	25.8	154.1	3.87	.65
64.5	23.6	127.0	4.25	.79
65.0	21.7	108.0	4.62	.93
65.5	20.1	93.9	4.99	1.06
66.0	18.7	83.1	5.36	1.20
66.5	17.5	74.5	5.73	1.34
67.0	16.4	67.6	6.10	1.48
67.5	15.5	61.8	6.47	1.62
68.0	14.6	56.9	6.84	1.76
68.5	13.9	52.8	7.21	1.90
69.0	13.2	49.2	7.58	2.03
69.5	12.6	46.0	7.95	2.17
70.0	12.0	43.3	8.33	2.31
70.5	11.5	40.8	8.70	2.45
71.0	11.0	38.6	9.07	2.59
71.5	10.6	36.7	9.44	2.73
72.0	10.2	34.9	9.81	2.86
72.5	9.8	33.3	10.18	3.00
73.0	9.5	31.8	10.55	3.14
73.5	9.2	30.5	10.92	3.28
74.0	8.9	29.2	11.29	3.42
74.5	8.6	28.1	11.66	3.56
75.0	8.3	27.1	12.04	3.70
75.5	8.1	26.1	12.41	3.83
76.0	7.8	25.2	12.78	3.97
76.5	7.6	24.3	13.15	4.11
77.0	7.4	23.5	13.52	4.25
77.5	7.2	22.8	13.89	4.39
78.0	7.0	22.1	14.26	4.53
78.5	6.8	21.4	14.63	4.67
79.0	6.7	20.8	15.00	4.80
79.5	6.5	20.2	15.37	4.94
80.0	6.4	19.7	15.75	5.08
80.5	6.2	19.2	16.12	5.22
81.0	6.1	18.7	16.49	5.36
81.5	5.9	18.2	16.86	5.50
82.0	5.8	17.7	17.23	5.63
82.5	5.7	17.3	17.60	5.77
83.0	5.6	16.9	17.97	5.91
83.5	5.5	16.5	18.34	6.05
84.0	5.3	16.2	18.71	6.19
84.5	5.2	15.8	19.08	6.33
85.0	5.1	15.5	19.46	6.47
85.5	5.[illegible]	15.1	19.83	6.60
86.0	5.[illegible]	14.8	20.20	6.74
86.5	4.9	14.5	20.57	6.88
87.0	4.8	14.2	20.94	7.02
87.5	4.7	14.[illegible]	21.31	7.16
88.0	4.6	13.7	21.68	7.30

TABLE 12.--BIG-EYED BUG, GEOCORIS PALLENS STAL--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY

	DURATION		PERCENT	
TEMP-F	EGG	NYMPHAL	EGG	NYMPHAL
88.5	4.5	13.4	22.05	7.44
89.0	4.5	13.2	22.42	7.57
89.5	4.4	13.0	22.79	7.71
90.0	4.3	12.7	23.17	7.85
90.5	4.2	12.5	23.54	7.99
91.0	4.2	12.3	23.91	8.13
91.5	4.1	12.1	24.28	8.27
92.0	4.1	11.9	24.65	8.40
92.5	4.0	11.7	25.02	8.54
93.0	3.9	11.5	25.39	8.68
93.5	3.9	11.3	25.76	8.82
94.0	3.8	11.2	26.13	8.96
94.5	3.8	11.0	26.50	9.10
95.0	3.7	10.8	26.88	9.24
95.5	3.7	10.7	27.25	9.37
96.0	3.6	10.5	27.62	9.51
96.5	3.6	10.4	27.99	9.65
97.0	3.5	10.2	28.36	9.79
97.5	3.5	10.1	28.73	9.93
98.0	3.4	9.9	29.10	10.07
98.5	3.4	9.8	29.47	10.21
99.0	3.4	9.7	29.84	10.34

TABLE 13.--BIG EYED BUG, GEOCORIS PUNCTIPES (SAY)

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY

	DURATION		PERCENT	
TEMP-F	EGG	NYMPHAL	EGG	NYMPHAL
59.0	3571.4	167.2	.03	.60
59.5	284.5	147.7	.35	.68
60.0	148.1	132.3	.68	.76
60.5	100.2	119.8	1.00	.83
61.0	75.6	109.4	1.32	.91
61.5	60.8	100.7	1.65	.99
62.0	50.8	93.3	1.97	1.07
62.5	43.6	86.9	2.29	1.15
63.0	38.2	81.3	2.62	1.23
63.5	34.0	76.4	2.94	1.31
64.0	30.6	72.0	3.26	1.39
64.5	27.9	68.2	3.59	1.47
65.0	25.6	64.7	3.91	1.55
65.5	23.6	61.5	4.23	1.62
66.0	21.9	58.7	4.56	1.70
66.5	20.5	56.1	4.88	1.78
67.0	19.2	53.7	5.20	1.86
67.5	18.1	51.5	5.53	1.94
68.0	17.1	49.5	5.85	2.02
68.5	16.2	47.6	6.17	2.10
69.0	15.4	45.9	6.50	2.18
69.5	14.7	44.3	6.82	2.26
70.0	14.0	42.8	7.15	2.34
70.5	13.4	41.4	7.47	2.41
71.0	12.8	40.1	7.79	2.49
71.5	12.3	38.9	8.12	2.57
72.0	11.8	37.7	8.44	2.65

TABLE 13.--BIG-EYED BUG, GEOCORIS PUNCTIPES (SAY)--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY

	DURATION		PERCENT	
TEMP-F	EGG	NYMPHAL	EGG	NYMPHAL
72.5	11.4	36.6	8.76	2.73
73.0	11.1	35.6	9.09	2.81
73.5	10.8	34.6	9.41	2.89
74.0	10.3	33.7	9.73	2.97
74.5	9.9	32.8	10.06	3.05
75.0	9.6	32.0	10.38	3.13
75.5	9.3	31.2	10.70	3.20
76.0	9.1	30.5	11.03	3.28
76.5	8.9	29.7	11.35	3.36
77.0	8.6	29.1	11.67	3.44
77.5	8.3	28.4	12.00	3.52
78.0	8.1	27.8	12.32	3.60
78.5	7.9	27.2	12.64	3.68
79.0	7.7	26.6	12.97	3.76
79.5	7.5	26.1	13.29	3.84
80.0	7.3	25.5	13.61	3.92
80.5	7.2	25.0	13.94	3.99
81.0	7.0	24.5	14.26	4.07
81.5	6.9	24.1	14.59	4.15
82.0	6.7	23.6	14.91	4.23
82.5	6.6	23.2	15.23	4.31
83.0	6.4	22.8	15.56	4.39
83.5	6.3	22.4	15.88	4.47
84.0	6.2	22.0	16.20	4.55
84.5	6.1	21.6	16.53	4.63
85.0	5.9	21.2	16.85	4.71
85.5	5.8	20.9	17.17	4.78
86.0	5.7	20.6	17.50	4.86
86.5	5.6	20.2	17.82	4.94
87.0	5.5	19.9	18.14	5.02
87.5	5.4	19.6	18.47	5.10
88.0	5.3	19.3	18.79	5.18
88.5	5.2	19.0	19.11	5.26
89.0	5.1	18.7	19.44	5.34
89.5	5.1	18.5	19.76	5.42
90.0	5.0	18.2	20.08	5.50
90.5	4.9	17.9	20.41	5.57
91.0	4.8	17.7	20.73	5.65
91.5	4.7	17.4	21.06	5.73
92.0	4.7	17.2	21.38	5.81
92.5	4.6	17.0	21.70	5.89
93.0	4.5	16.8	22.03	5.97
93.5	4.5	16.5	22.35	6.05
94.0	4.4	16.3	22.67	6.13
94.5	4.3	16.1	23.00	6.21
95.0	4.3	15.9	23.32	6.29
95.5	4.2	15.7	23.64	6.36
96.0	4.2	15.5	23.97	6.44
96.5	4.1	15.3	24.29	6.52
97.0	4.1	15.1	24.61	6.60
97.5	4.0	15.0	24.94	6.68
98.0	4.0	14.8	25.26	6.76
98.5	3.9	14.6	25.58	6.84
99.0	3.9	14.5	25.91	6.92

TABLE 14.--COMMON GREEN LACEWING, CHRYSOPA CARNEA STEPHENS

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
55.0	15.7	39.9	30.6	6.37	2.51	3.27
55.5	14.8	37.4	29..	6.73	2.68	3.44
56.0	14.1	35.1	27.6	7.10	2.85	3.62
56.5	13.4	33.2	26.4	7.46	3.01	3.79
57.0	12.8	31.4	25.2	7.82	3.18	3.97
57.5	12.2	29.8	24.1	8.18	3.35	4.14
58.0	11.7	28.4	23.2	8.54	3.52	4.32
58.5	11.2	27.1	22.3	8.91	3.69	4.49
59.0	10.8	25.9	21.4	9.27	3.86	4.67
59.5	10.4	24.8	20.6	9.63	4.03	4.84
60.0	10.0	23.8	19.9	9.99	4.20	5.02
60.5	9.7	22.9	19.3	10.35	4.37	5.19
61.0	9.3	22.0	18.6	10.72	4.54	5.37
61.5	9.0	21.2	18.0	11.08	4.71	5.54
62.0	8.7	20.5	17.5	11.44	4.88	5.72
62.5	8.5	19.8	17.0	11.80	5.05	5.89
63.0	8.2	19.2	16.5	12.16	5.22	6.07
63.5	8.0	18.6	16.0	12.53	5.39	6.24
64.0	7.8	18.0	15.6	12.89	5.56	6.42
64.5	7.5	17.5	15.2	13.25	5.73	6.59
65.0	7.3	17.0	14.8	13.61	5.90	6.77
65.5	7.2	16.5	14.4	13.97	6.07	6.94
66.0	7.0	16.0	14.0	14.34	6.24	7.12
66.5	6.8	15.6	13.7	14.70	6.40	7.29
67.0	6.6	15.2	13.4	15.06	6.57	7.47
67.5	6.5	14.8	13.1	15.42	6.74	7.64
68.0	6.3	14.5	12.8	15.78	6.91	7.82
68.5	6.2	14.1	12.5	16.15	7.08	7.99
69.0	6.1	13.8	12.2	16.51	7.25	8.17
69.5	5.9	13.5	12.0	16.87	7.42	8.34
70.0	5.8	13.2	11.7	17.23	7.59	8.52
70.5	5.7	12.9	11.5	17.59	7.76	8.69
71.0	5.6	12.6	11.3	17.96	7.93	8.87
71.5	5.5	12.3	11.1	18.32	8.10	9.04
72.0	5.4	12.1	10.8	18.68	8.27	9.22
72.5	5.3	11.9	10.6	19.04	8.44	9.39
73.0	5.2	11.6	10.5	19.40	8.61	9.57
73.5	5.1	11.4	10.3	19.77	8.78	9.74
74.0	5.0	11.2	10.1	20.13	8.95	9.92
74.5	4.9	11.0	9.9	20.49	9.12	10.09
75.0	4.8	10.8	9.7	20.85	9.29	10.27
75.5	4.7	10.6	9.5	21.21	9.46	10.44
76.0	4.6	10.4	9.4	21.58	9.62	10.62
76.5	4.6	10.2	9.3	21.94	9.79	10.79
77.0	4.5	10.0	9.1	22.30	9.96	10.97
77.5	4.4	9.9	9.0	22.66	10.13	11.14
78.0	4.3	9.7	8.8	23.02	10.30	11.32
78.5	4.3	9.5	8.7	23.39	10.47	11.49
79.0	4.2	9.4	8.6	23.75	10.64	11.67
79.5	4.1	9.2	8.4	24.11	10.81	11.84
80.0	4.1	9.1	8.3	24.47	10.98	12.02
80.5	4.0	9.0	8.2	24.83	11.15	12.19
81.0	4.0	8.8	8.1	25.20	11.32	12.37
81.5	3.9	8.7	8.0	25.56	11.49	12.54
82.0	3.9	8.6	7.9	25.92	11.66	12.72
82.5	3.8	8.5	7.8	26.28	11.83	12.89
83.0	3.8	8.3	7.7	26.64	12.00	13.07
83.5	3.7	8.2	7.6	27.01	12.17	13.24

TABLE 14.--COMMON GREEN LACEWING, CHRYSOPA CARNEA STEPHENS--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
84.[illegible]	3.7	[illegible].1	7.5	27.37	12.34	13.42
84.5	3.[illegible]	[illegible].[illegible]	7.4	27.73	12.51	13.59
85.[illegible]	3.6	7.9	7.3	28.09	12.68	13.77
85.5	3.5	7.8	7.2	28.45	12.85	13.94
86.[illegible]	3.5	7.7	7.1	28.82	13.01	14.12
86.5	3.4	7.6	7.0	29.18	13.18	14.29
87.[illegible]	3.4	7.5	6.9	29.54	13.35	14.47
87.5	3.3	7.4	6.8	29.90	13.52	14.64
88.[illegible]	3.3	7.3	6.7	30.26	13.69	14.82
88.5	3.3	7.2	6.7	30.63	13.86	14.99
89.[illegible]	3.2	7.1	6.6	30.99	14.03	15.17
89.5	3.2	7.[illegible]	6.5	31.35	14.20	15.34
90.[illegible]	3.2	7.0	6.4	31.71	14.37	15.52
90.5	3.1	6.9	6.4	32.07	14.54	15.69
91.[illegible]	3.1	6.8	6.3	32.44	14.71	15.87
91.5	3.[illegible]	6.7	6.2	32.80	14.88	16.04
92.[illegible]	3.[illegible]	6.6	6.2	33.16	15.05	16.22
92.5	3.[illegible]	6.[illegible]	6.1	33.52	15.22	16.39
93.[illegible]	3.0	6.5	6.0	33.88	15.39	16.57
93.5	2.9	6.4	6.0	34.25	15.56	16.74
94.[illegible]	2.9	6.4	5.9	34.61	15.73	16.92
94.5	2.9	6.3	5.9	34.97	15.90	17.09
95.[illegible]	2.8	6.2	5.8	35.33	16.07	17.27

TABLE 15.--CONVERGENT LADY BEETLE, HIPPODAMIA CONVERGENS GUERIN-MENEVILLE

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
55.[illegible]	30.8	5[illegible].9	20.4	3.24	1.97	4.90
55.5	25.[illegible]	48.1	18.9	3.95	2.08	5.30
56.[illegible]	21.5	45.6	17.5	4.65	2.19	5.71
56.5	18.7	43.4	16.3	5.35	2.30	6.12
57.[illegible]	16.5	41.4	15.3	6.06	2.42	6.52
57.5	14.[illegible]	39.5	14.4	6.76	2.53	6.93
58.[illegible]	13.4	37.[illegible]	13.6	7.47	2.64	7.34
58.5	12.2	36.3	12.9	8.17	2.76	7.74
59.[illegible]	11.3	34.[illegible]	12.3	8.87	2.87	8.15
59.5	10.4	33.5	11.7	9.58	2.98	8.56
60.[illegible]	9.7	32.3	11.2	10.28	3.10	8.96
60.5	9.1	31.[illegible]	10.7	10.98	3.21	9.37
61.[illegible]	8.6	30.1	10.2	11.69	3.32	9.78
61.5	8.1	29.1	9.8	12.39	3.43	10.18
62.[illegible]	7.6	28.2	9.4	13.09	3.55	10.59
62.5	7.[illegible]	27.[illegible]	9.1	13.80	3.66	10.99
63.[illegible]	6.9	26.5	8.8	14.50	3.77	11.40
63.5	[illegible].6	25.7	8.5	15.20	3.89	11.81
64.[illegible]	[illegible].[illegible]	25.[illegible]	8.2	15.91	4.00	12.21
64.5	6.0	24.3	7.9	16.61	4.11	12.62
65.[illegible]	5.[illegible]	23.7	7.7	17.31	4.23	13.03
65.5	5.6	23.[illegible]	7.4	18.02	4.34	13.43
66.[illegible]	5.[illegible]	22.5	7.2	18.72	4.45	13.84
66.5	5.1	21.9	7.0	19.42	4.56	14.25
67.[illegible]	5.[illegible]	21.4	6.8	20.13	4.68	14.65
67.5	4.[illegible]	20.9	6.6	20.83	4.79	15.06

TABLE 15.--CONVERGENT LADY BEETLE, HIPPODAMIA CONVERGENS GUERIN-MENEVILLE--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
68.0	4.6	20.4	6.5	21.54	4.90	15.47
68.5	4.5	19.9	6.3	22.24	5.02	15.87
69.0	4.4	19.5	6.1	22.94	5.13	16.28
69.5	4.2	19.1	6.0	23.65	5.24	16.69
70.0	4.1	18.7	5.9	24.35	5.36	17.09
70.5	4.0	18.3	5.7	25.05	5.47	17.50
71.0	3.9	17.9	5.6	25.76	5.58	17.90
71.5	3.8	17.6	5.5	26.46	5.69	18.31
72.0	3.7	17.2	5.3	27.16	5.81	18.72
72.5	3.6	16.9	5.2	27.87	5.92	19.12
73.0	3.5	16.6	5.1	28.57	6.03	19.53
73.5	3.4	16.3	5.1	29.27	6.15	19.94
74.0	3.3	16.0	4.9	29.98	6.26	20.34
74.5	3.3	15.7	4.8	30.68	6.37	20.75
75.0	3.2	15.4	4.7	31.38	6.49	21.16
75.5	3.1	15.2	4.6	32.09	6.60	21.56
76.0	3.0	14.9	4.6	32.79	6.71	21.97
76.5	3.0	14.7	4.5	33.49	6.82	22.38
77.0	2.9	14.4	4.4	34.20	6.94	22.78
77.5	2.9	14.2	4.3	34.90	7.05	23.19
78.0	2.8	14.0	4.2	35.60	7.16	23.60
78.5	2.8	13.7	4.2	36.31	7.28	24.00
79.0	2.7	13.5	4.1	37.01	7.39	24.41
79.5	2.7	13.3	4.0	37.72	7.50	24.82
80.0	2.6	13.1	4.0	38.42	7.62	25.22
80.5	2.6	12.9	3.9	39.12	7.73	25.63
81.0	2.5	12.8	3.8	39.83	7.84	26.03
81.5	2.5	12.6	3.8	40.53	7.95	26.44
82.0	2.4	12.4	3.7	41.23	8.07	26.85
82.5	2.4	12.2	3.7	41.94	8.18	27.25
83.0	2.3	12.1	3.6	42.64	8.29	27.66
83.5	2.3	11.9	3.6	43.34	8.41	28.07
84.0	2.3	11.7	3.5	44.05	8.52	28.47
84.5	2.2	11.6	3.5	44.75	8.63	28.88
85.0	2.2	11.4	3.4	45.45	8.75	29.29
85.5	2.2	11.3	3.4	46.16	8.86	29.69
86.0	2.1	11.1	3.3	46.86	8.97	30.10
86.5	2.1	11.0	3.3	47.56	9.08	30.51
87.0	2.1	10.9	3.2	48.27	9.20	30.91
87.5	2.0	10.7	3.2	48.97	9.31	31.32
88.0	2.0	10.6	3.2	49.67	9.42	31.73
88.5	2.0	10.5	3.1	50.38	9.54	32.13
89.0	2.0	10.4	3.1	51.08	9.65	32.54
89.5	1.9	10.2	3.0	51.79	9.76	32.95
90.0	1.9	10.1	3.0	52.49	9.88	33.35
90.5	1.9	10.0	3.0	53.19	9.99	33.76
91.0	1.9	9.9	2.9	53.90	10.10	34.16
91.5	1.8	9.8	2.9	54.60	10.21	34.57
92.0	1.8	9.7	2.9	55.30	10.33	34.98
92.5	1.8	9.6	2.8	56.01	10.44	35.38
93.0	1.8	9.5	2.8	56.71	10.55	35.79
93.5	1.7	9.4	2.8	57.41	10.67	36.20
94.0	1.7	9.3	2.7	58.12	10.78	36.60
94.5	1.7	9.2	2.7	58.82	10.89	37.01
95.0	1.7	9.1	2.7	59.52	11.01	37.42

TABLE 16.--LEAFHOPPER ASSASIN, ZELUS RENARDI KOLENATI

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY

	DURATION		PERCENT	
TEMP-F	EGG	NYMPHAL	EGG	NYMPHAL
55.[illegible]	94.2	228.8	1.06	.44
55.5	74.5	204.5	1.34	.49
56.[illegible]	61.6	184.8	1.62	.54
56.5	52.5	168.6	1.91	.59
57.[illegible]	45.7	155.6	2.19	.64
57.5	40.5	143.5	2.47	.70
58.[illegible]	36.4	133.5	2.75	.75
58.5	33.0	124.8	3.03	.80
59.[illegible]	30.2	117.2	3.31	.85
59.5	27.8	110.5	3.59	.90
60.[illegible]	25.8	104.5	3.87	.96
60.5	24.1	99.1	4.15	1.01
61.[illegible]	22.6	94.3	4.43	1.06
61.5	21.2	89.[illegible]	4.72	1.11
62.[illegible]	20.[illegible]	85.[illegible]	5.00	1.16
62.5	19.[illegible]	82.2	5.28	1.22
63.[illegible]	18.[illegible]	78.[illegible]	5.56	1.27
63.5	17.1	75.7	5.84	1.32
64.[illegible]	16.3	72.[illegible]	6.12	1.37
64.5	15.6	70.2	6.40	1.42
65.[illegible]	15.[illegible]	67.7	6.68	1.48
65.5	14.4	65.4	6.96	1.53
66.[illegible]	13.[illegible]	63.3	7.24	1.58
66.5	13.[illegible]	61.[illegible]	7.53	1.63
67.[illegible]	12.[illegible]	59.3	7.81	1.68
67.5	12.4	57.6	8.09	1.74
68.[illegible]	12.[illegible]	55.9	8.37	1.79
68.5	11.[illegible]	54.3	8.65	1.84
69.[illegible]	11.2	52.[illegible]	8.93	1.89
69.5	10.9	51.4	9.21	1.94
70.[illegible]	10.5	50.1	9.49	2.00
70.5	10.2	48.[illegible]	9.77	2.05
71.[illegible]	9.9	47.6	10.05	2.10
71.5	9.7	46.4	10.34	2.15
72.[illegible]	9.4	45.4	10.62	2.20
72.5	9.2	44.3	10.90	2.26
73.[illegible]	8.9	43.3	11.18	2.31
73.5	8.7	42.4	11.46	2.36
74.[illegible]	8.5	41.4	11.74	2.41
74.5	8.3	40.6	12.02	2.46
75.[illegible]	8.1	39.7	12.30	2.52
75.5	7.9	38.9	12.58	2.57
76.[illegible]	7.8	38.2	12.86	2.62
76.5	7.6	37.4	13.15	2.67
77.[illegible]	7.4	36.7	13.43	2.72
77.5	7.3	36.[illegible]	13.71	2.78
78.[illegible]	7.1	35.3	13.99	2.83
78.5	7.[illegible]	34.7	14.27	2.88
79.[illegible]	6.[illegible]	34.1	14.55	2.93
79.5	6.7	33.[illegible]	14.83	2.98
80.[illegible]	6.6	32.[illegible]	15.11	3.04
80.5	6.5	32.4	15.39	3.09
81.[illegible]	6.4	31.6	15.67	3.14
81.5	6.3	31.3	15.96	3.19
82.[illegible]	6.2	30.[illegible]	16.24	3.24

TABLE 16.--LEAFHOPPER ASSASIN, ZELUS RENARDI KOLENATI--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY

	DURATION		PERCENT	
TEMP-F	EGG	NYMPHAL	EGG	NYMPHAL
82.5	6.1	30.1	16.52	3.30
83.0	6.1	29.9	16.80	3.35
83.5	5.9	29.4	17.08	3.40
84.0	5.8	29.0	17.36	3.45
84.5	5.7	28.5	17.64	3.50
85.0	5.6	28.1	17.92	3.56
85.5	5.5	27.7	18.20	3.61
86.0	5.4	27.3	18.48	3.66
86.5	5.3	26.9	18.77	3.71
87.0	5.3	26.6	19.05	3.76
87.5	5.2	26.2	19.33	3.82
88.0	5.1	25.8	19.61	3.87
88.5	5.0	25.5	19.89	3.92
89.0	5.0	25.2	20.17	3.97
89.5	4.9	24.8	20.45	4.02
90.0	4.8	24.5	20.73	4.08
90.5	4.8	24.2	21.01	4.13
91.0	4.7	23.9	21.29	4.18
91.5	4.6	23.6	21.57	4.23
92.0	4.6	23.3	21.86	4.28
92.5	4.5	23.1	22.14	4.34
93.0	4.5	22.8	22.42	4.39
93.5	4.4	22.5	22.70	4.44
94.0	4.4	22.3	22.98	4.49
94.5	4.3	22.0	23.26	4.54
95.0	4.2	21.8	23.54	4.60

TABLE 17.--LEAFHOPPER ASSASIN BUG, ZELUS SOCIUS UHLER

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY

	DURATION		PERCENT	
TEMP-F	EGG	NYMPHAL	EGG	NYMPHAL
55.0	127.4	147.1	.78	.68
55.5	91.2	137.5	1.10	.73
56.0	71.1	129.6	1.41	.77
56.5	58.2	121.6	1.72	.82
57.0	49.3	114.9	2.03	.87
57.5	42.7	109.0	2.34	.92
58.0	37.7	103.6	2.65	.96
58.5	33.8	98.8	2.96	1.01
59.0	30.6	94.3	3.27	1.06
59.5	27.9	90.3	3.58	1.11
60.0	25.7	86.6	3.89	1.15
60.5	23.8	83.2	4.21	1.20
61.0	22.1	80.0	4.52	1.25
61.5	20.7	77.1	4.83	1.30
62.0	19.5	74.3	5.14	1.34
62.5	18.3	71.8	5.45	1.39
63.0	17.4	69.4	5.76	1.44
63.5	16.5	67.2	6.07	1.49
64.0	15.7	65.1	6.38	1.53
64.5	14.9	63.2	6.69	1.58
65.0	14.3	61.3	7.00	1.63
65.5	13.7	59.6	7.32	1.68
66.0	13.1	58.0	7.63	1.72
66.5	12.6	56.4	7.94	1.77

TABLE 17.--LEAFHOPPER ASSASSIN BUG, ZELUS SOCIUS UHLER--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY

	DURATION		PERCENT	
TEMP-F	EGG	NYMPHAL	EGG	NYMPHAL
67.0	12.1	54.9	8.25	1.82
67.5	11.7	53.5	8.56	1.87
68.0	11.3	52.2	8.87	1.91
68.5	10.9	51.0	9.18	1.96
69.0	10.5	49.8	9.49	2.01
69.5	10.2	48.6	9.80	2.06
70.0	9.9	47.5	10.11	2.10
70.5	9.6	46.5	10.43	2.15
71.0	9.3	45.5	10.74	2.20
71.5	9.1	44.5	11.05	2.25
72.0	8.8	43.6	11.36	2.29
72.5	8.6	42.7	11.67	2.34
73.0	8.3	41.8	11.98	2.39
73.5	8.1	41.0	12.29	2.44
74.0	7.9	40.2	12.60	2.48
74.5	7.7	39.5	12.91	2.53
75.0	7.6	38.8	13.22	2.58
75.5	7.4	38.1	13.54	2.63
76.0	7.2	37.4	13.85	2.67
76.5	7.1	36.7	14.16	2.72
77.0	6.9	36.1	14.47	2.77
77.5	6.8	35.5	14.78	2.82
78.0	6.6	34.9	15.09	2.86
78.5	6.5	34.3	15.40	2.91
79.0	6.4	33.7	15.71	2.96
79.5	6.2	33.3	16.02	3.01
80.0	6.1	32.7	16.33	3.05
80.5	6.0	32.2	16.65	3.10
81.0	5.9	31.7	16.96	3.15
81.5	5.8	31.3	17.27	3.20
82.0	5.7	30.8	17.58	3.24
82.5	5.6	30.4	17.89	3.29
83.0	5.5	29.9	18.20	3.34
83.5	5.4	29.5	18.51	3.39
84.0	5.3	29.1	18.82	3.43
84.5	5.2	28.7	19.13	3.48
85.0	5.1	28.3	19.44	3.53
85.5	5.1	28.0	19.76	3.58
86.0	5.0	27.6	20.07	3.62
86.5	4.9	27.2	20.38	3.67
87.0	4.8	26.9	20.69	3.72
87.5	4.8	26.5	21.00	3.77
88.0	4.7	26.2	21.31	3.81
88.5	4.6	25.9	21.62	3.86
89.0	4.6	25.6	21.93	3.91
89.5	4.5	25.3	22.24	3.96
90.0	4.4	25.0	22.55	4.00
90.5	4.4	24.7	22.87	4.05
91.0	4.3	24.4	23.18	4.10
91.5	4.3	24.1	23.49	4.15
92.0	4.2	23.8	23.80	4.19
92.5	4.1	23.6	24.11	4.24
93.0	4.1	23.3	24.42	4.29
93.5	4.0	23.1	24.73	4.34
94.0	4.0	22.8	25.04	4.38
94.5	3.9	22.6	25.35	4.43
95.0	3.9	22.3	25.66	4.48

TABLE 18.--MINUTE PIRATE BUG, ORIUS TRISTICOLOR (WHITE)

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY

	DURATION		PERCENT	
TEMP-F	EGG	NYMPHAL	EGG	NYMPHAL
55.0	14.9	28.0	6.71	3.57
55.5	14.6	27.4	7.13	3.65
56.0	13.2	26.8	7.56	3.73
56.5	12.5	26.3	7.98	3.81
57.0	11.9	25.7	8.40	3.89
57.5	11.3	25.2	8.82	3.97
58.0	10.8	24.7	9.24	4.05
58.5	10.3	24.2	9.67	4.13
59.0	9.9	23.8	10.09	4.21
59.5	9.5	23.3	10.51	4.29
60.0	9.1	22.9	10.93	4.37
60.5	8.8	22.5	11.35	4.45
61.0	8.5	22.1	11.78	4.53
61.5	8.2	21.7	12.20	4.61
62.0	7.9	21.3	12.62	4.69
62.5	7.7	21.0	13.04	4.77
63.0	7.4	20.6	13.46	4.85
63.5	7.2	20.3	13.89	4.93
64.0	7.0	20.0	14.31	5.01
64.5	6.8	19.7	14.73	5.09
65.0	6.6	19.4	15.15	5.17
65.5	6.4	19.1	15.57	5.25
66.0	6.3	18.8	16.00	5.33
66.5	6.1	18.5	16.42	5.41
67.0	5.9	18.2	16.84	5.49
67.5	5.8	18.0	17.26	5.57
68.0	5.7	17.7	17.68	5.65
68.5	5.5	17.5	18.11	5.73
69.0	5.4	17.2	18.53	5.81
69.5	5.3	17.0	18.95	5.89
70.0	5.2	16.8	19.37	5.97
70.5	5.1	16.5	19.79	6.05
71.0	4.9	16.3	20.22	6.13
71.5	4.8	16.1	20.64	6.21
72.0	4.7	15.9	21.06	6.29
72.5	4.7	15.7	21.48	6.37
73.0	4.6	15.5	21.90	6.45
73.5	4.5	15.3	22.33	6.53
74.0	4.4	15.1	22.75	6.61
74.5	4.3	15.0	23.17	6.69
75.0	4.2	14.8	23.59	6.77
75.5	4.2	14.6	24.01	6.85
76.0	4.1	14.4	24.44	6.93
76.5	4.0	14.3	24.86	7.01
77.0	4.0	14.1	25.28	7.09
77.5	3.9	14.0	25.70	7.17
78.0	3.8	13.8	26.12	7.25
78.5	3.8	13.7	26.55	7.33
79.0	3.7	13.5	26.97	7.41
79.5	3.7	13.4	27.39	7.49
80.0	3.6	13.2	27.81	7.57
80.5	3.5	13.1	28.23	7.65
81.0	3.5	12.9	28.66	7.73
81.5	3.4	12.8	29.08	7.81
82.0	3.4	12.7	29.50	7.89
82.5	3.3	12.6	29.92	7.97
83.0	3.3	12.4	30.34	8.05
83.5	3.3	12.3	30.77	8.13
84.0	3.2	12.2	31.19	8.21

TABLE 18.--MINUTE PIRATE BUG, ORIUS TRISTICOLOR (WHITE)--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY

	DURATION		PERCENT	
TEMP-F	EGG	NYMPHAL	EGG	NYMPHAL
84.5	3.2	12.1	31.61	8.29
85.0	3.1	12.0	32.03	8.37
85.5	3.1	11.8	32.45	8.45
86.0	3.0	11.7	32.88	8.53
86.5	3.0	11.6	33.30	8.61
87.0	3.0	11.5	33.72	8.69
87.5	2.9	11.4	34.14	8.77
88.0	2.9	11.3	34.56	8.85
88.5	2.9	11.2	34.99	8.93
89.0	2.8	11.1	35.41	9.01
89.5	2.8	11.0	35.83	9.09
90.0	2.8	10.9	36.25	9.17
90.5	2.7	10.8	36.67	9.25
91.0	2.7	10.7	37.10	9.33
91.5	2.7	10.6	37.52	9.41
92.0	2.6	10.5	37.94	9.49
92.5	2.6	10.5	38.36	9.57
93.0	2.6	10.4	38.78	9.65
93.5	2.6	10.3	39.21	9.73
94.0	2.5	10.2	39.63	9.81
94.5	2.5	10.1	40.05	9.89
95.0	2.5	10.0	40.47	9.97

TABLE 19.--SPINED SOLDIER BUG, SINEA CONFUSA CAUDELL

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY

	DURATION		PERCENT	
TEMP-F	EGG	NYMPHAL	EGG	NYMPHAL
55.0	-1123.6	-1149.4	-.09	-.09
55.5	604.2	-3389.8	.17	-.03
56.0	238.1	3571.4	.42	.03
56.5	148.3	1159.6	.67	.09
57.0	107.5	694.3	.93	.14
57.5	84.5	498.8	1.18	.20
58.0	69.5	387.6	1.44	.26
58.5	59.1	317.0	1.69	.32
59.0	51.4	268.1	1.95	.37
59.5	45.4	232.3	2.20	.43
60.0	40.7	204.9	2.46	.49
60.5	36.9	183.3	2.71	.55
61.0	33.7	165.8	2.97	.60
61.5	31.1	151.4	3.22	.66
62.0	28.8	139.3	3.47	.72
62.5	26.8	128.9	3.73	.78
63.0	25.1	120.0	3.98	.83
63.5	23.6	112.3	4.24	.89
64.0	22.3	105.5	4.49	.95
64.5	21.1	99.5	4.75	1.01
65.0	20.0	94.1	5.00	1.06
65.5	19.0	89.2	5.26	1.12
66.0	18.1	84.9	5.51	1.18
66.5	17.3	80.9	5.76	1.24
67.0	16.6	77.3	6.02	1.29
67.5	15.9	74.0	6.27	1.35
68.0	15.3	71.0	6.53	1.41

TABLE 19.--SPINED SOLDIER BUG, SINEA CONFUSA CAUDELL--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY

	DURATION		PERCENT	
TEMP-F	EGG	NYMPHAL	EGG	NYMPHAL
68.5	14.7	68.2	6.78	1.47
69.0	14.2	65.7	7.04	1.52
69.5	13.7	63.3	7.29	1.58
70.0	13.3	61.1	7.55	1.64
70.5	12.8	59.0	7.80	1.70
71.0	12.4	57.0	8.06	1.75
71.5	12.0	55.2	8.31	1.81
72.0	11.7	53.5	8.56	1.87
72.5	11.3	51.9	8.82	1.93
73.0	11.0	50.4	9.07	1.98
73.5	10.7	49.0	9.33	2.04
74.0	10.4	47.7	9.58	2.10
74.5	10.2	46.4	9.84	2.16
75.0	9.9	45.2	10.09	2.21
75.5	9.7	44.0	10.35	2.27
76.0	9.4	43.0	10.60	2.33
76.5	9.2	41.9	10.85	2.39
77.0	9.0	40.9	11.11	2.44
77.5	8.8	40.0	11.36	2.50
78.0	8.6	39.1	11.62	2.56
78.5	8.4	38.2	11.87	2.62
79.0	8.2	37.4	12.13	2.67
79.5	8.1	36.6	12.38	2.73
80.0	7.9	35.9	12.64	2.79
80.5	7.8	35.1	12.89	2.85
81.0	7.6	34.4	13.15	2.90
81.5	7.5	33.8	13.40	2.96
82.0	7.3	33.1	13.65	3.02
82.5	7.2	32.5	13.91	3.08
83.0	7.1	31.9	14.16	3.13
83.5	6.9	31.3	14.42	3.19
84.0	6.8	30.8	14.67	3.25
84.5	6.7	30.3	14.93	3.31
85.0	6.6	29.7	15.18	3.36
85.5	6.5	29.2	15.44	3.42
86.0	6.4	28.8	15.69	3.48
86.5	6.3	28.3	15.94	3.54
87.0	6.2	27.8	16.20	3.59
87.5	6.1	27.4	16.45	3.65
88.0	6.0	27.0	16.71	3.71
88.5	5.9	26.6	16.96	3.77
89.0	5.8	26.2	17.22	3.82
89.5	5.7	25.8	17.47	3.88
90.0	5.6	25.4	17.73	3.94
90.5	5.6	25.0	17.98	4.00
91.0	5.5	24.7	18.24	4.05
91.5	5.4	24.3	18.49	4.11
92.0	5.3	24.0	18.74	4.17
92.5	5.3	23.7	19.00	4.23
93.0	5.2	23.3	19.25	4.28
93.5	5.1	23.0	19.51	4.34
94.0	5.1	22.7	19.76	4.40
94.5	5.0	22.4	20.02	4.46
95.0	4.9	22.2	20.27	4.51

TABLE 20.--STRIPED COLLOPS, COLLOPS VITTATUS (SAY)

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
59.0	256.4	-88.3	-34.5	.39	-1.13	-2.87
59.5	147.3	-94.2	-40.8	.68	-1.06	-2.45
60.0	103.3	-101.0	-49.2	.97	-.99	-2.03
60.5	79.6	-108.9	-62.0	1.26	-.92	-1.61
61.0	64.7	-118.1	-83.9	1.55	-.85	-1.19
61.5	54.5	-128.9	-129.6	1.83	-.78	-.77
62.0	47.1	-142.0	-284.9	2.12	-.70	-.35
62.5	41.4	-158.1	1438.8	2.41	-.63	.07
63.0	37.0	-178.3	204.1	2.70	-.56	.49
63.5	33.4	-204.3	109.8	2.99	-.49	.91
64.0	30.5	-239.2	75.1	3.28	-.42	1.33
64.5	28.0	-288.6	57.1	3.57	-.35	1.75
65.0	25.9	-363.6	46.0	3.86	-.28	2.17
65.5	24.1	-491.4	38.6	4.15	-.20	2.59
66.0	22.5	-757.6	33.2	4.44	-.13	3.01
66.5	21.2	-1652.9	29.1	4.72	-.06	3.43
67.0	19.9	9999.9	25.9	5.01	.01	3.85
67.5	18.9	1212.1	23.4	5.30	.08	4.27
68.0	17.9	649.4	21.3	5.59	.15	4.69
68.5	17.0	443.5	19.5	5.88	.23	5.12
69.0	16.2	336.7	18.1	6.17	.30	5.54
69.5	15.5	271.4	16.8	6.46	.37	5.96
70.0	14.8	227.3	15.7	6.75	.44	6.38
70.5	14.2	195.5	14.7	7.04	.51	6.80
71.0	13.7	171.5	13.9	7.33	.58	7.22
71.5	13.1	152.8	13.1	7.61	.65	7.64
72.0	12.7	137.7	12.4	7.90	.73	8.06
72.5	12.2	125.4	11.8	8.19	.80	8.48
73.0	11.8	115.1	11.2	8.48	.87	8.90
73.5	11.4	106.3	10.7	8.77	.94	9.32
74.0	11.0	98.8	10.3	9.06	1.01	9.74
74.5	10.7	92.3	9.8	9.35	1.08	10.16
75.0	10.4	86.6	9.5	9.64	1.15	10.58
75.5	10.1	81.5	9.1	9.93	1.23	11.00
76.0	9.8	77.0	8.8	10.22	1.30	11.42
76.5	9.5	73.0	8.4	10.50	1.37	11.84
77.0	9.3	69.4	8.2	10.79	1.44	12.26
77.5	9.0	66.1	7.9	11.08	1.51	12.68
78.0	8.8	63.1	7.6	11.37	1.58	13.10
78.5	8.6	60.4	7.4	11.66	1.66	13.53
79.0	8.4	57.9	7.2	11.95	1.73	13.95
79.5	8.2	55.6	7.0	12.24	1.80	14.37
80.0	8.0	53.5	6.8	12.53	1.87	14.79
80.5	7.8	51.5	6.6	12.82	1.94	15.21
81.0	7.6	49.7	6.4	13.11	2.01	15.63
81.5	7.5	48.0	6.2	13.39	2.08	16.05
82.0	7.3	46.4	6.1	13.68	2.16	16.47
82.5	7.2	44.9	5.9	13.97	2.23	16.89
83.0	7.0	43.5	5.8	14.26	2.30	17.31
83.5	6.9	42.2	5.6	14.55	2.37	17.73
84.0	6.7	41.0	5.5	14.84	2.44	18.15
84.5	6.6	39.8	5.4	15.13	2.51	18.57
85.0	6.5	38.7	5.3	15.42	2.59	18.99
85.5	6.4	37.6	5.2	15.71	2.66	19.41
86.0	6.3	36.7	5.0	16.00	2.73	19.83
86.5	6.1	35.7	4.9	16.28	2.80	20.25
87.0	6.0	34.8	4.8	16.57	2.87	20.67
87.5	5.9	34.0	4.7	16.86	2.94	21.09
88.0	5.8	33.2	4.6	17.15	3.01	21.51

TABLE 20.--STRIPED COLLOPS, COLLOPS VITTATUS (SAY)--CONTINUED.

THE DURATION IN DAYS AND THE PERCENT OF DEVELOPMENT PER DAY OF THE STAGES

	DURATION			PERCENT		
TEMP-F	EGG	LARVA	PUPA	EGG	LARVA	PUPA
88.5	5.7	32.4	4.6	17.44	3.09	21.94
89.0	5.6	31.7	4.5	17.73	3.16	22.36
89.5	5.5	31.0	4.4	18.02	3.23	22.78
90.0	5.5	30.3	4.3	18.31	3.30	23.20
90.5	5.4	29.7	4.2	18.60	3.37	23.62
91.0	5.3	29.0	4.2	18.89	3.44	24.04
91.5	5.2	28.5	4.1	19.17	3.51	24.46
92.0	5.1	27.9	4.0	19.46	3.59	24.88
92.5	5.1	27.3	4.0	19.75	3.66	25.30
93.0	5.0	26.8	3.9	20.04	3.73	25.72
93.5	4.9	26.3	3.8	20.33	3.80	26.14
94.0	4.8	25.8	3.8	20.62	3.87	26.56
94.5	4.8	25.4	3.7	20.91	3.94	26.98
95.0	4.7	24.9	3.6	21.20	4.01	27.40
95.5	4.7	24.5	3.6	21.49	4.09	27.82
96.0	4.6	24.1	3.5	21.78	4.16	28.24
96.5	4.5	23.6	3.5	22.06	4.23	28.66
97.0	4.5	23.3	3.4	22.35	4.30	29.08
97.5	4.4	22.9	3.4	22.64	4.37	29.50
98.0	4.4	22.5	3.3	22.93	4.44	29.92
98.5	4.3	22.1	3.3	23.22	4.52	30.35
99.0	4.3	21.8	3.3	23.51	4.59	30.77

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